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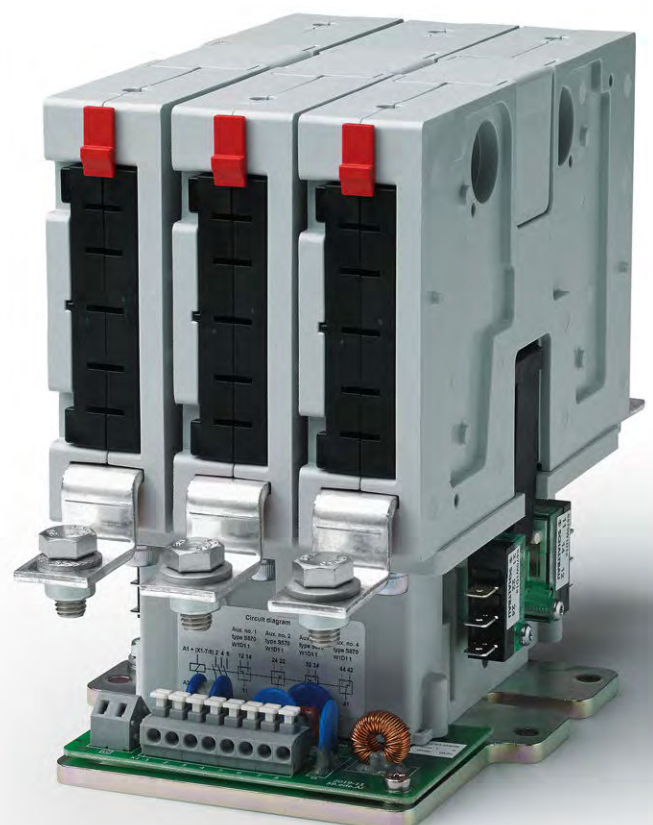
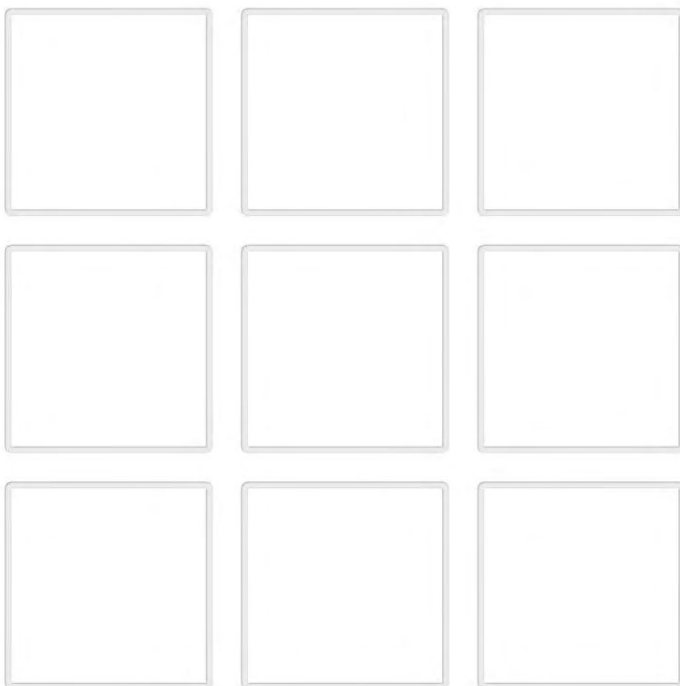
Contactors

CF series

**Multipole
AC power contactors
for 300 A or 600 A
with NO or NC
switching chambers**

**Installation and
maintenance instructions**

Manual C60-M.en



Document Revision History

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1. Important basic information

1.1 Legal notes

Without prior written consent of SCHALTBAU GmbH, this manual is not allowed to be electronically or mechanically reproduced – as a whole or in parts – be distributed, changed, transmitted, translated into another language or used in any other way.

SCHALTBAU GmbH cannot be held liable for damage caused by non- or only partial observation of the manual.

1.2 Conventions for this manual

This manual describes the installation and maintenance of the contactors.

Cross references are presented in *bold italics*.

To highlight particularly important safety instructions and other information, the following symbols are used in this manual:

DANGER

Indicates a directly threatening dangerous situation. Death or severe injuries will result if it is not prevented.

WARNING

Indicates a possibly dangerous situation. Death or severe injuries may result if it is not prevented.

CAUTION

Indicates a possibly dangerous situation. Medium or minor injuries may result if it is not prevented.

ATTENTION

Indicates a possibly detrimental situation. If it is not prevented, assemblies, the system or property in its surroundings could be damaged.



Indicates technical features and methods to simplify working or indicates information of particular importance.

This manual refers to multi-pole AC/DC power contactors of the CF series with nominal voltages of 1,500 V and 3,000 V. The contactors can be equipped with both normally open and normally closed switching elements.

The CF series devices can be configured as normally open/normally closed contactors or in combination as a change-over. Depending on the configuration, the following abbreviations are used in this manual:

NO = Normally Opened

NC = Normally Closed

CO = Change Over

Due to the high modularity, the CF series devices offer a wide range of configuration options. Therefore, not all possible configurations can be presented in this manual.

Even if the configurations shown do not correspond exactly to the present device, the installation and maintenance steps can be carried out identically as described in this manual.

2. General and safety information

The contactors dealt with in this document are intended for use with electrical systems for special applications. They are designed and tested in compliance with generally accepted codes of practice. However, improper use, operation, handling, maintenance of or tampering with electric equipment can cause serious or fatal injury to the user or others, and the appliance or other property can be damaged. Consequently, the operation, maintenance and installation instructions for the contactors must be strictly followed.

If anything is not clear, clarification must be sought with any queries stating the device type and the serial number.

Only authorised and trained personnel are allowed to plan and carry out all mechanical and electrical installations, transport, commissioning, as well as maintenance and repair work.

This applies to the observation of the general installation and safety regulations for electrical systems as well as the proper use of tools approved for this purpose. Electrical equipment requires protection from moisture and dust during installation, operation and storage.

2.1 Observing the manual

▶ All personnel must read and understand the instructions in this manual and adhere to them when working with the device.

▶ **Always adhere strictly to all safety instructions!**

2.2 Duties of the operating company

- ▶ Observe all applicable national regulations, all safety, accident prevention and environmental protection regulations as well as the recognised technical rules for safe and correct working.
- ▶ Regularly check all fitted protection and safety equipment for correct function.
- ▶ Work on electrical equipment must only be carried out by a qualified electrician or by instructed persons under the supervision and control of a qualified electrician in accordance with electrical regulations.
- ▶ A specialist is someone who, on the basis of his technical training, knowledge and experience as well as knowledge of the relevant regulations, is able to assess the work assigned to him and identify possible dangers.
- ▶ Work on the contactors must only be carried out by personnel who meet the requirements set out in this manual.
- ▶ Personnel must be clearly informed about who is responsible for the maintenance of the contactors.
- ▶ Always perform complete checks after any installation work and/or after any other conversions, alterations or maintenance, in accordance with the following standards:
 - EN/IEC 60077-2
 - EN/IEC 60947-4-1

2.3 Intended use

- ▶ The contactors have been designed and tested according to national and international standards. Due to their unique features they can also be used in a wide range of industrial applications.
- ▶ The contactors must only be used under operating conditions according to the technical specifications and the instructions in this manual.
- ▶ None of the conditions of use, such as voltages, currents or ambient conditions, defined in the corresponding technical data sheets or in our **C60 catalogue** may be overridden. The **catalogue** is available under: <https://www.schaltbau.com/en/media-library/>
- ▶ The contactors may only be used when all protective devices are present, have been correctly installed and are fully operational.
- ▶ Contactors may not be used without other safety precautions in potentially explosive atmospheres and/or in aggressive media.

- ▶ The switching device meets the requirements of basic insulation. Make sure the frame or plate onto which the drive of the contactor is mounted is earthed in a shock and vibration resistant way.
- ▶ Do not use the contactor without properly mounted arc chambers or switching element covers.
- ▶ The contactor has unprotected live parts and carries labels that warn of the hazard. This warnings must be observed and the labels must not be removed in any way.
- ▶ The prescribed clearances relative to other live parts or earth and other parts must be complied with as well as the safety regulations of the applicable standards.
- ▶ Switching at close to the maximum breaking capacity may require increased minimum clearances! Do not hesitate to ask our advice in respect of any dimensioning.
- ▶ Coil suppression for reducing surges when the coil is switched off is optimally attuned to the contactor's switching behaviour. The existing opening characteristic must not be negatively influenced by parallel connection with an external diode.
- ▶ Improper handling of the contactors, e.g. impacts on the floor, may result in breakage, cracks or deformation. Always handle the device with care.
- ▶ Only use the contactors for the specified application and only with original parts. Any other usage of or tampering with the contactors is considered contrary to their intended use. No liability is assumed for damages and accidents caused due to non-compliance with the instructions in this manual or improper use of the contactors.

2.4 Ambient conditions






ATTENTION

The contactors have been designed for specific ambient conditions.


- ▶ Only operate the contactors in ambient conditions, such as temperature ranges, degree of soiling, etc., as defined in the corresponding data sheets and in our **C60 catalogue**. The **catalogue** is available under: <https://www.schaltbau.com/en/media-library/>


3. Hazards and safety precautions


3.1 Electrical hazards

	<p>⚠ DANGER</p> <p>The contactors are used for high voltage switching. Contact with live electrical parts can result in serious injuries or even death! Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists. Before starting any work on the contactors, always comply with the following safety rules:</p> <ul style="list-style-type: none"> ▶ Disconnect on all sides ▶ Secure to prevent switching back on ▶ Clearly identify the working area ▶ Check that a voltage-free state exists ▶ Earth and short circuit; this includes discharging any capacitors in the main circuit ▶ Besides the main power circuits, also disconnect additional and auxiliary circuits ▶ Cover or insulate adjacent live parts ▶ The presence of a voltage-free state can only be clearly identified by a qualified electrician. ▶ When the work has been concluded, follow the procedure in reverse.
	<p>⚠ DANGER</p> <p>The contactors are equipped with a protective earth terminal. Without earth connection, metal parts and wires may be energized in the case of a failure. Risk of serious injuries or even death!</p> <ul style="list-style-type: none"> ▶ Make sure that the contactors are connected to earth. ▶ Make sure that the wire gauge of the earthing cables complies with the specific short circuit conditions.
	<p>⚠ DANGER</p> <p>In the case of a failure of the equipment;</p> <ul style="list-style-type: none"> ▶ don't use it anymore ▶ immediately contact the manufacturer.
	<p>⚠ DANGER</p> <p>Interventions in the equipment may cause serious impairments to the safety of men and constructions. They are not permissible and lead to an exclusion of liability and warranty.</p>
	<p>⚠ DANGER</p> <p>All checks and the replacement of components or groups of components may only be carried out by qualified personnel according to the instructions of Schaltbau. All spare parts must be parts delivered by or released by Schaltbau.</p>

3.2 Other hazards

	<p>⚠ WARNING</p>
	<p>Contactors must only be used for the purposes specified in the specifications and data sheets. Incorrect use can cause accidents and severe personal injury.</p> <ul style="list-style-type: none"> ▶ The manufacturer will not be responsible for accidents arising from improper use of the product.

	<p>⚠ CAUTION</p>
	<p>During continuous operation the contactors may become hot. Risk of burns!</p> <ul style="list-style-type: none"> ▶ Before beginning any checks or maintenance on the contactors ensure that the heated components have cooled down.

	<p>⚠ CAUTION</p>
	<p>The contactors contain sharp-edged parts. Risk of injuries!</p> <ul style="list-style-type: none"> ▶ Use appropriate tools for installation and maintenance work on the contactors. ▶ Wear safety gloves when handling sharp-edged components.

3.3 Measures for avoiding damage and malfunctions

<p>ATTENTION</p>
<p>Aggressive liquids may damage the contactors.</p> <ul style="list-style-type: none"> ▶ Ensure the contactors do not come into contact with aggressive liquids.

<p>ATTENTION</p>
<p>Improper handling of the contactors, e.g. dropping on the floor, can result in breaks, cracks and deformation.</p> <ul style="list-style-type: none"> ▶ Ensure the contactors are always handled correctly. ▶ Do not throw the contactors on the floor. ▶ At regular intervals perform a visual check of the contactors for possible damage. ▶ Immediately replace any damaged parts.

<p>ATTENTION</p>
<p>Depending on the product type, contactors can contain permanent magnets. Such magnets can attract ferromagnetic parts resulting in damage to the contactors.</p> <ul style="list-style-type: none"> ▶ Ensure that the contactors are installed in a location where it is not possible for them to attract any ferromagnetic parts.

<p>ATTENTION</p>
<p>Depending on the product type, contactors can contain permanent magnets. These permanent magnets can destroy the data on the magnetic strips of credit or similar cards.</p> <ul style="list-style-type: none"> ▶ Keep credit or similar cards away from the contactors.

ATTENTION

During switching off, strong electromagnetic fields are generated in the vicinity of the contactors. These may influence other components close to the contactors.

- ▶ Make sure that the contactors are installed in a location where no other components are affected.

ATTENTION

In the case of damage, wear and/or soiling of the contactors - in the form of a partial break, sharp edges and discoloured surfaces - the functional reliability of the contactors is no longer ensured.

- ▶ Visually inspect the contactors regularly to detect wear and soiling.
- ▶ Replace damaged parts immediately.
- ▶ Immediately remove any soiling without leaving any residues.
- ▶ Immediately replace any parts with persistent soiling.

ATTENTION

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of undoing of the screws in the work log.
- ▶ Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

4. Product information

4.1 CF – Multipole AC/DC power contactors

The highly modular CF series comes with compact 1-pole up to 6-pole AC/DC power contactors for loads up to 600 A and 3,000 V for inverter-fed alternating current drives with higher frequencies. One special feature are the newly developed switching elements. These can be universally configured as NO, NC or in combination as a change-over (CO).

An efficient electronic economy circuit reduces power consumption as well as heat loss and saves costs.

CF contactors can be adapted in many ways. The high variance makes the devices interesting for use in many different applications. The innovative switchgear is equally ideal for new projects and modernisation. They can successfully replace cam contactors that have proven themselves over many years.

Easy maintenance:

- ▶ Toolless inspection of main contact tips
- ▶ Toolless replacement of the arc chamber inserts

4.2 Characteristics

- ▶ Compact dimensions – high performance range: 1,500 or 3,000 Volt AC/DC, 3x 600 amps, frequencies up to 400 Hertz
- ▶ Innovative application-dependent arcing chamber design – configurable as NO, NC or change-over (CO) contact
- ▶ High thermal continuous current 200, 300 and 400 amps or 600 amps through parallel connection of two main contacts each and a high rated short-time withstand current up to 4,000 amps
- ▶ Up to 4 auxiliary switches for diagnosis and switching status monitoring
- ▶ Low energy consumption and low heating thanks to sophisticated coil saving circuit

4.3 Technical information and material properties

For technical information and material properties, refer to the corresponding data sheets and to our **C60 catalogue**. The **catalogue** is available under:

<https://www.schaltbau.com/en/media-library/>

5. Description

5.1 Modular design

5.1.1 CF – 1,500 V, 200 and 300 A, AC/DC contactors (NO configuration examples)

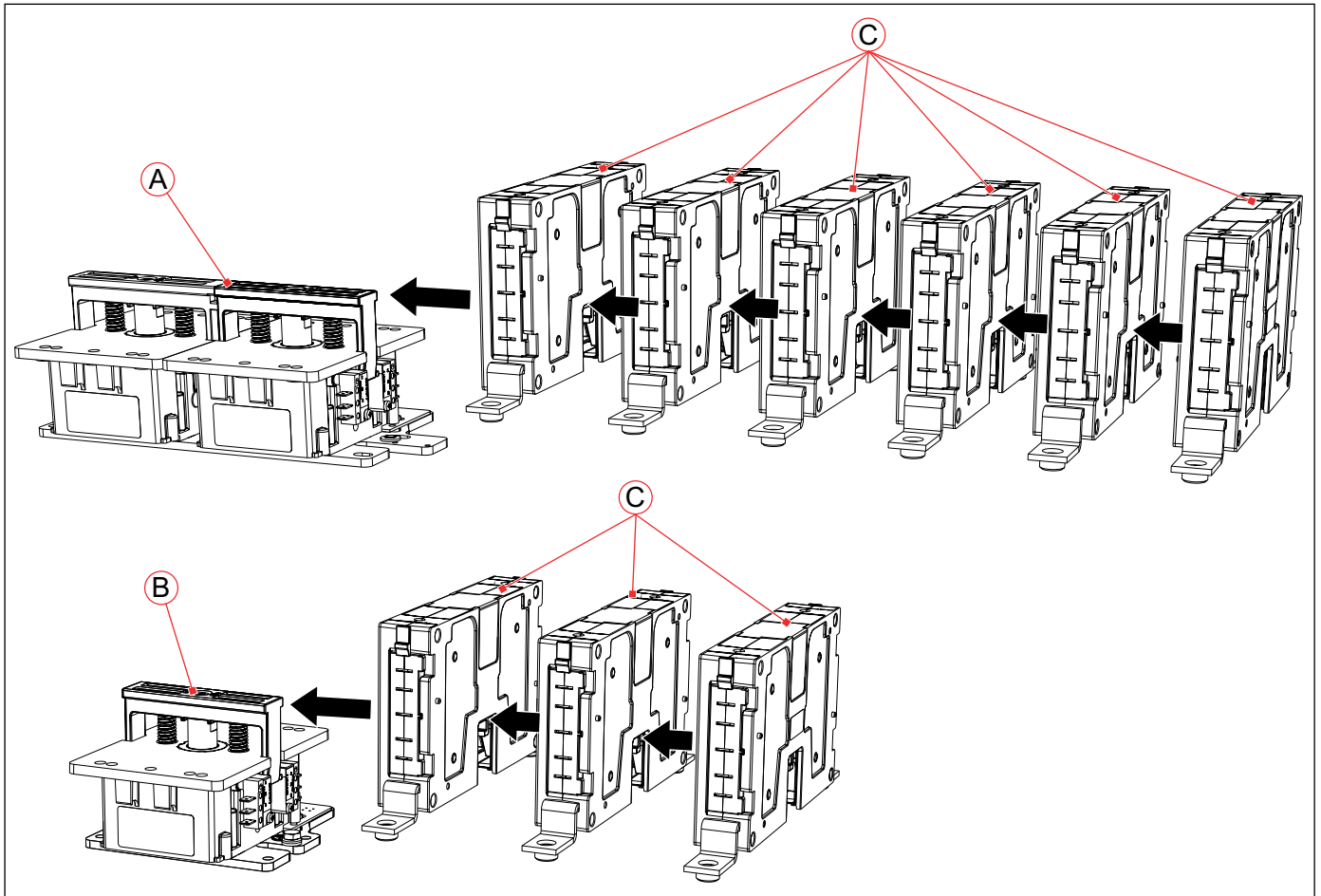


Fig. 1: 1,500 V, 200 and 300 A, AC/DC contactors – coil drive designs and switching elements (NO configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C Switching elements
with NO configuration:
 - max. 6 switching elements with coil drive wide
 - max. 3 switching elements with coil drive small

5.1.2 CF – 3,000 V, 200 and 300 A, AC/DC contactors (NO configuration examples)

For contactors with 3000 V, insulating plates are required between the switching elements and, depending on the installation situation, on the two outer sides.

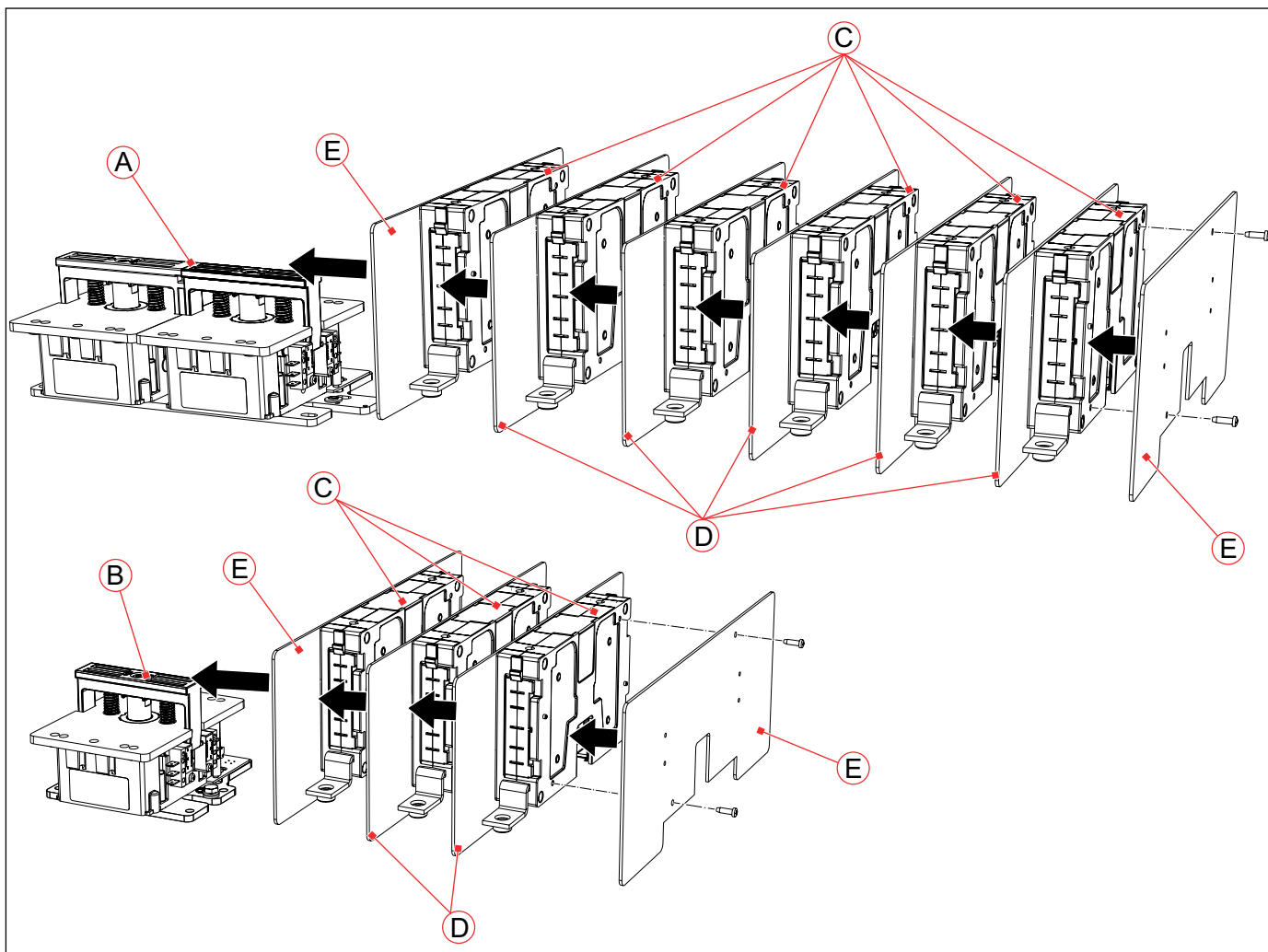


Fig. 2: 3,000 V, 200 and 300 A, AC/DC contactors – coil drive designs and switching elements with insulating plates (NO configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C Switching elements
with NO configuration:
- max. 6 switching elements with coil drive wide
- max. 3 switching elements with coil drive small
- D Insulating plates (required for 3,000 V contactors)
- E Insulating end panels (required for 3,000 V contactors)

5.1.3 CF – 1,500 V/3,000V, 200 and 300 A, AC/DC contactors (NC configuration examples)

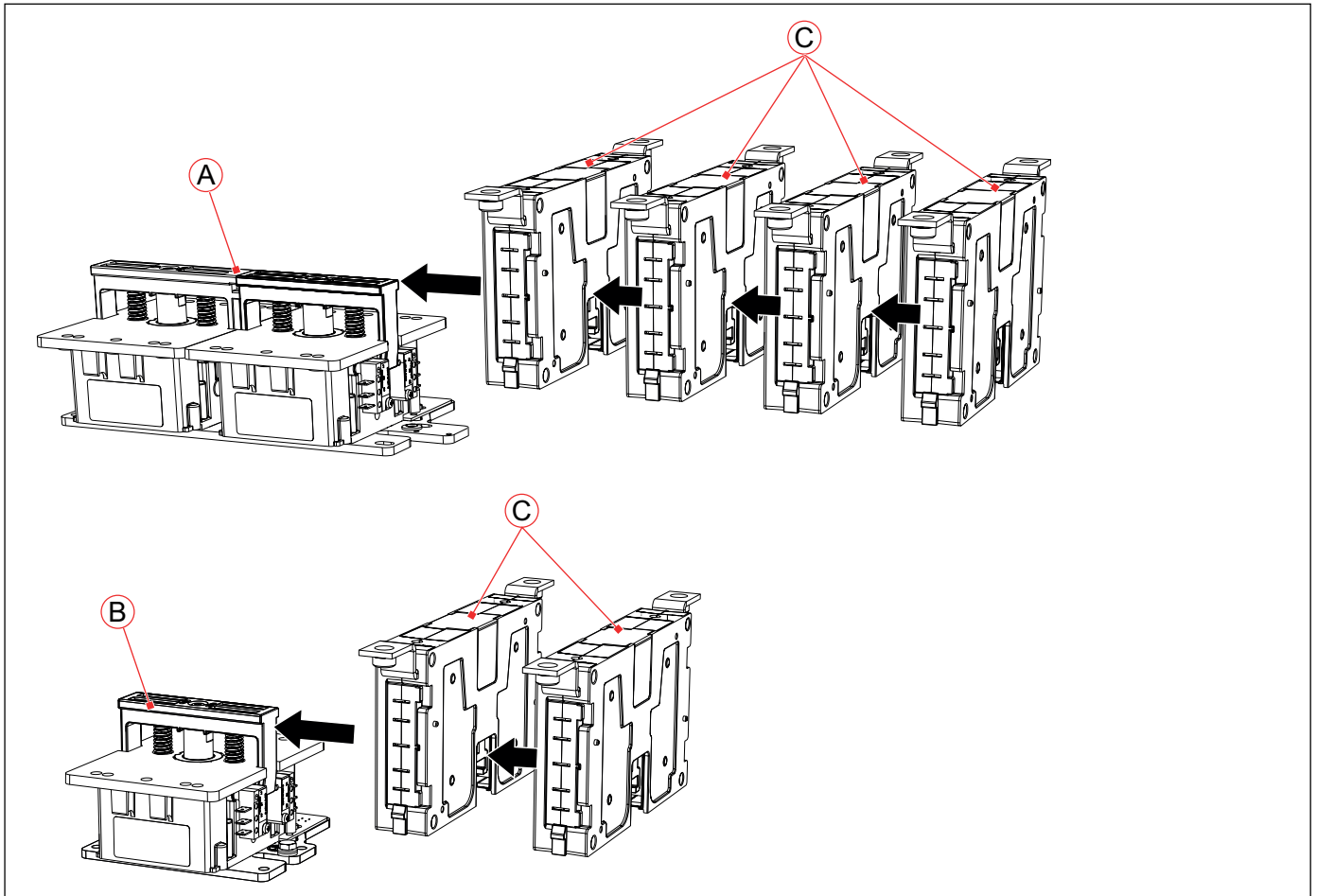


Fig. 3: 1,500 V/3,000V, 200 and 300 A, AC/DC contactors – coil drive designs and switching elements
(NC configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C Switching elements
with NC configuration:
 - max. 4 switching elements with coil drive wide
 - max. 2 switching elements with coil drive small

5.1.4 CF – 1,500 V/3,000 V, 400 A, AC/DC contactors (NO configuration examples)

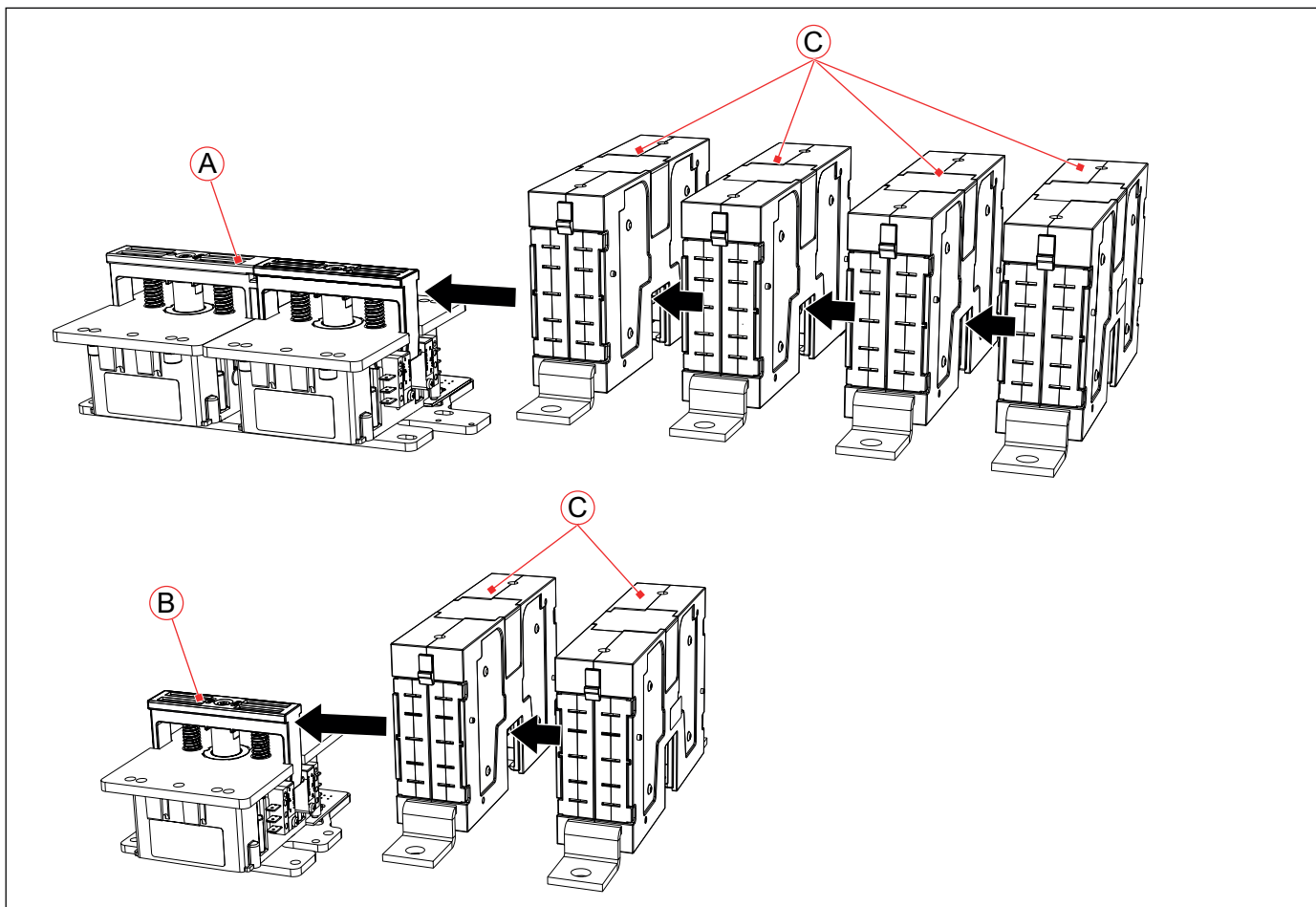


Fig. 4: 1,500 V/3,000 V, 400 A, AC/DC contactors – coil drive designs and switching elements (NO configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C Switching elements (400 A)
 - max. 4 switching elements with coil drive wide
 - max. 2 switching elements with coil drive small

5.1.5 CF – 1,500 V, 200 and 300 A, AC/DC contactors (CO configuration examples)

A changeover (CO) contactor configuration is obtained by combining one NO and one NC switching element and connecting the main contacts on one side.

In this way, up to 3 CO contactors can be set up with the wide coil drive and 1 CO contactor with the small coil drive.

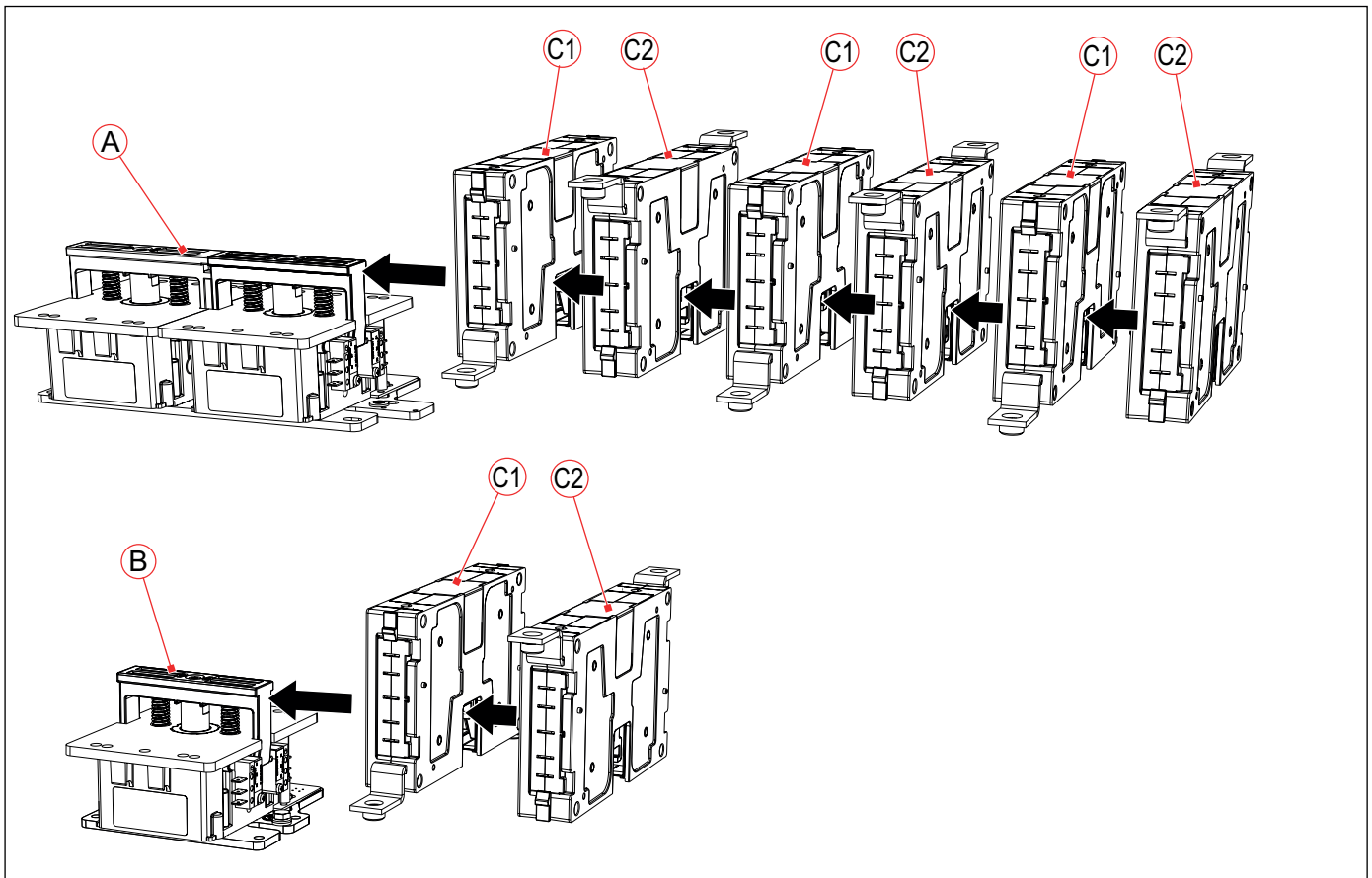


Fig. 5: 1,500 V, 200 and 300 A, AC/DC contactors – coil drive designs and switching elements (CO configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C1 Switching elements with NO configuration
- C2 Switching elements with NC configuration

5.1.6 CF – 3,000 V, 200 and 300 A, AC/DC contactors (CO configuration examples)

For contactors with 3,000 V, insulating plates are required between each pair of CO switching elements and, depending on the installation situation, on the two outer sides.

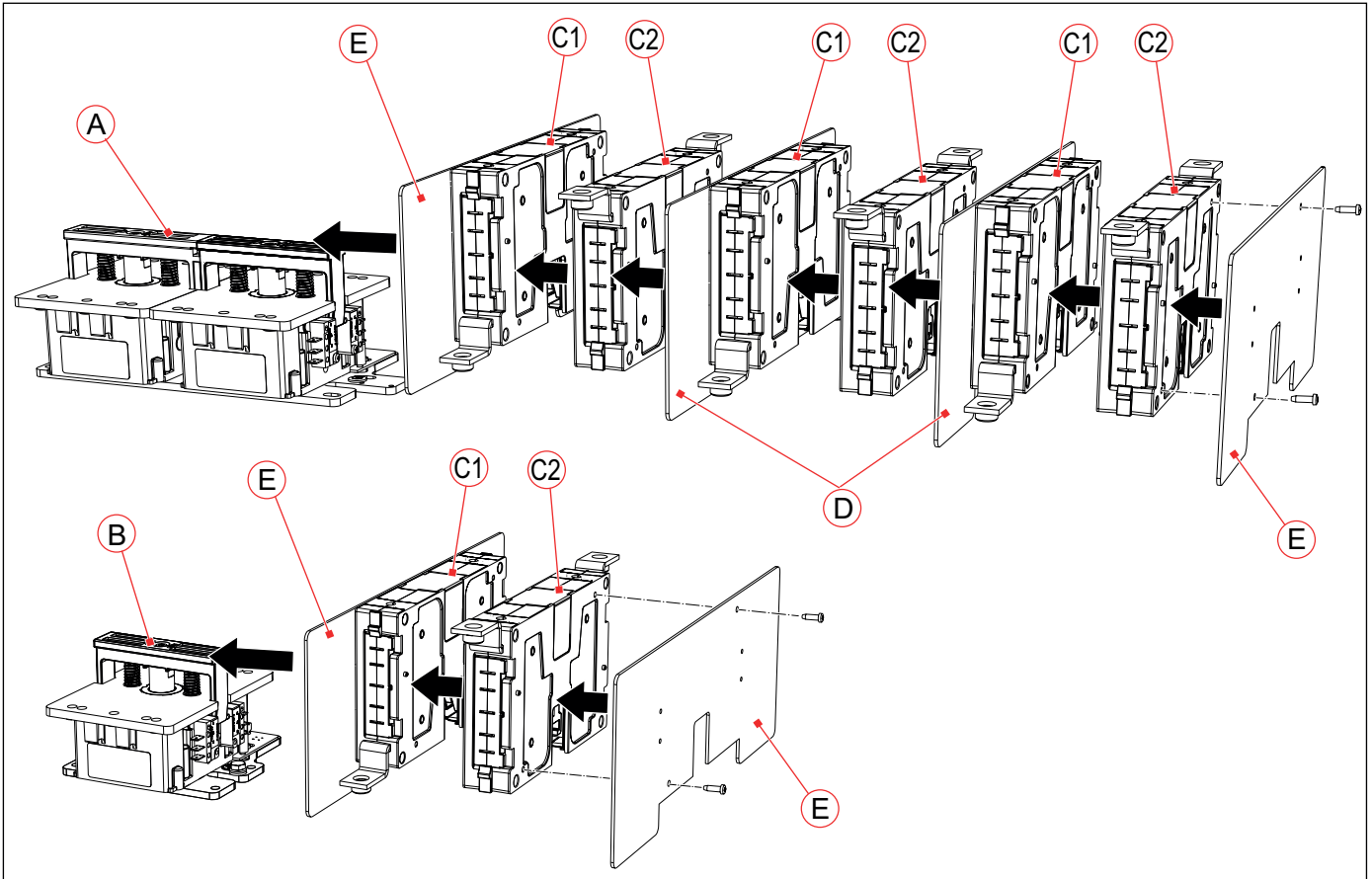


Fig. 6: 3,000 V, 200 and 300 A, AC/DC contactors – coil drive designs and switching elements with insulating plates (CO configuration examples)

- A Coil drive wide (2 drives)
- B Coil drive small (1 drive)
- C1 Switching elements with NO configuration
- C2 Switching elements with NC configuration
- D Insulating plates (required for 3,000 V contactors)
- E Insulating end panels (required for 3,000 V contactors)

5.1.7 Switching element configuration – 200 and 300 A

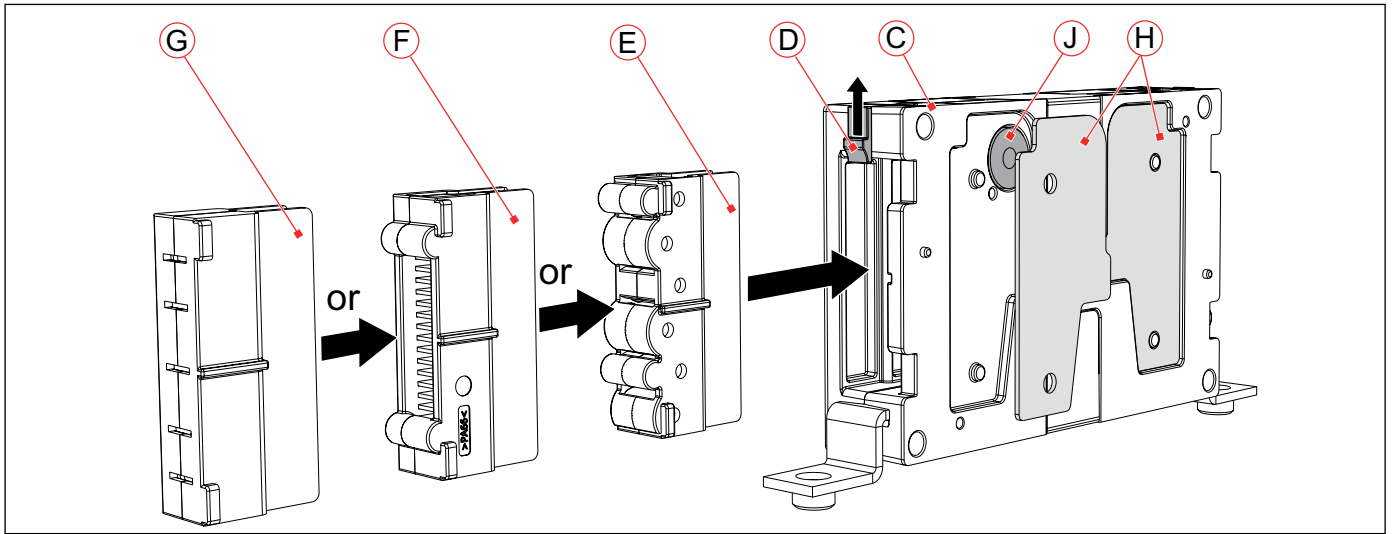


Fig. 7: Switching element 200 and 300 A (NO configuration example) and arcing chamber inserts

- | | | | |
|---|--|---|--|
| C | Switching element (NO configuration example) | H | Pole plates – only for DC versions (unidirectional) |
| D | Latch / unlatch button | J | Magnetic cores – only for DC versions (unidirectional) |
| E | Ceramic arcing chamber insert | | |
| F | Arcing chamber insert with metal arcing plates | | |
| G | Plastic arcing chamber insert | | |

5.1.8 Switching element configuration – 400 A

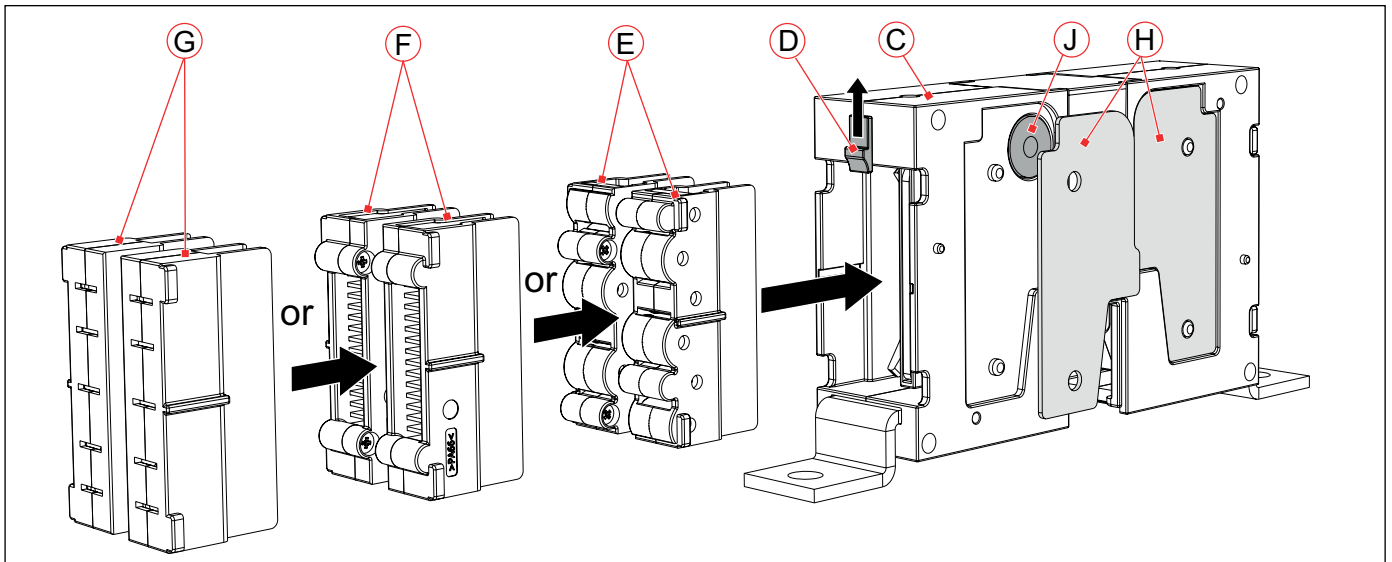


Fig. 8: Switching element 400 A (NO configuration example) and arcing chamber inserts

- | | | | |
|---|---|---|---------------------------------------|
| C | Switching element (NO configuration example) | H | Pole plates – only for DC versions |
| D | Latch / unlatch button | J | Magnetic cores – only for DC versions |
| E | Ceramic arcing chamber insert (2x) | | |
| F | Arcing chamber insert with metal arcing plates (2x) | | |
| G | Plastic arcing chamber insert (2x) | | |

5.2 Configuration examples of the CF contactor series (stock items)

5.2.1 Examples of NO and NC contactors (AC/DC) – 200 and 300 A

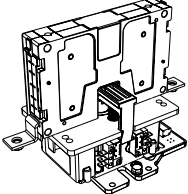
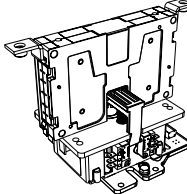
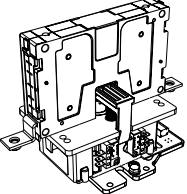
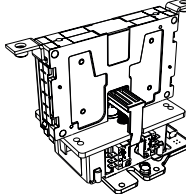
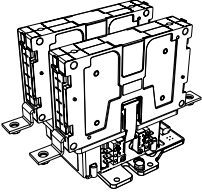
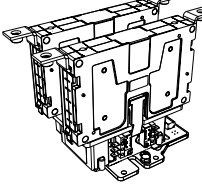
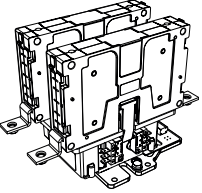
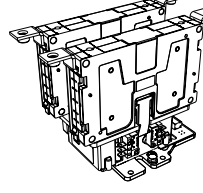
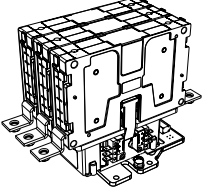
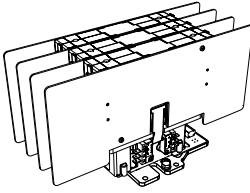
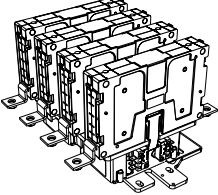
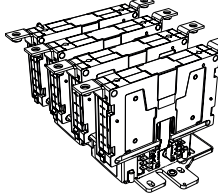
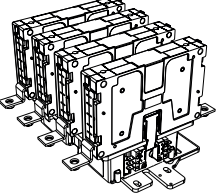
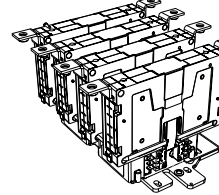
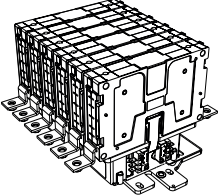
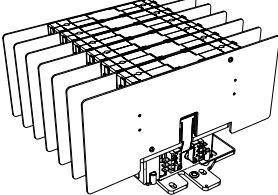
Type of coil drive	No. of poles	1,500 V		3,000 V	
		NO	NC	NO	NC
small	1				
	2				
	3		---		---
wide	4				
	6		---		---

Fig. 9: Configuration examples of 200 and 300 A, NO/NC contactors (the figures show DC versions, AC versions are similar but without pole plates and magnetic cores)

5.2.2 Examples of NO and NC contactors (AC/DC) – 400 A

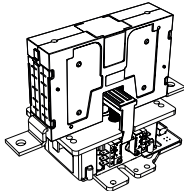
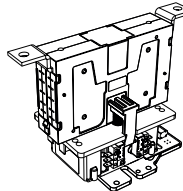
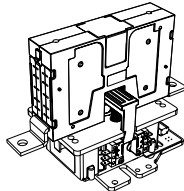
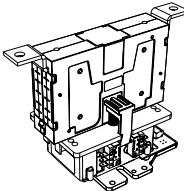
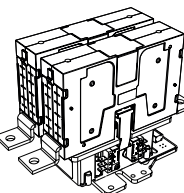
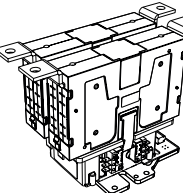
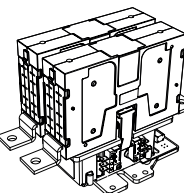
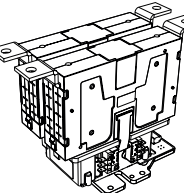
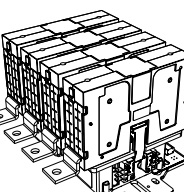
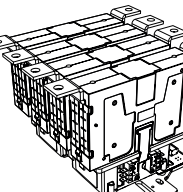
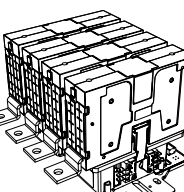
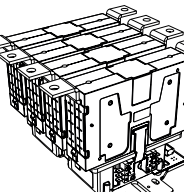
Type of coil drive	No. of poles	1,500 V		3,000 V	
		NO	NC	NO	NC
small	1				
	2				
wide	4				

Fig. 10: Configuration examples of 400 A NO/NC contactors (the figures show DC versions, AC versions are similar but without pole plates and magnetic cores)

5.2.3 Examples of CO contactors (AC/DC) – 200 and 300 A

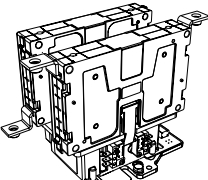
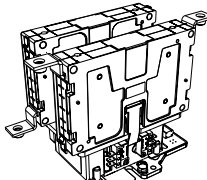
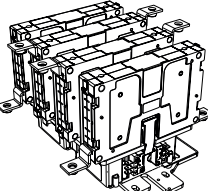
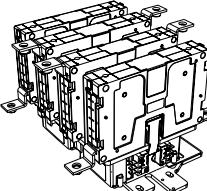
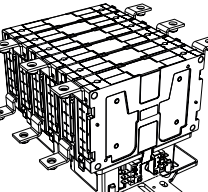
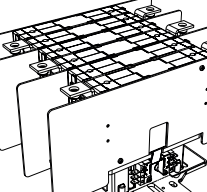
Type of coil drive	No. of poles	1,500 V	3,000 V
		CO	CO
small	2		
wide	4		
	6		

Fig. 11: Configuration examples of 200 and 300 A CO contactors (the figures show DC versions, AC versions are similar but without pole plates and magnetic cores)

5.2.4 Examples of CO contactors (AC/DC) – 400 A

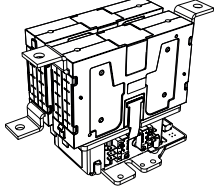
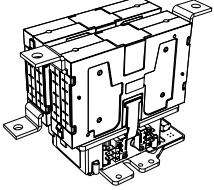
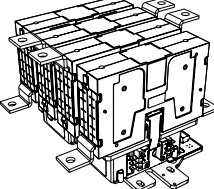
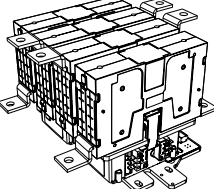
Type of coil drive	No. of poles	1,500 V	3,000 V
		CO	CO
small	2		
wide	4		

Fig. 12: Configuration examples of 400 A CO contactors (the figures show DC versions, AC versions are similar but without pole plates and magnetic cores)

6. Storage

ATTENTION

Moisture and dust can damage the contactors. If the device is to be stored for a prolonged period of time:

- ▶ Store the device in its original packaging,
- ▶ Store the device in a dry and dust-free location.

Return shipments

Schaltbau recommends retaining the original packaging for any return shipments.

If the original packaging is not available, care must be taken to pack the contactor in a way that prevents damage during shipment.

7. Unpacking

7.1 Unpacking the device

- ▶ Before opening the packaging, perform a visual inspection for any signs that could indicate damage having occurred during transport (impacts, bumps, dropping, etc.).
- ▶ If any signs indicate that the contactor has been subject to excessive impacts do not install it.

7.2 Check parts for transport damage

ATTENTION

If parts are damaged, functional reliability of the contactor has been lost.

- ▶ Before installing, check all parts for possible transport damage.
- ▶ Do not install damaged parts.

8. Installation

8.1 Mounting

8.1.1 Dimensions/interfaces and further technical specifications

The dimensions and other technical specifications are given in the respective data sheets or can be found in our *C60 catalogue*. The *catalogue* is available under: <https://www.schaltbau.com/en/media-library/>

8.1.2 Preparatory measures

- ▶ A suitable mounting plate with 4 mounting holes in accordance with the following dimensional drawings (*Fig. 13 and Fig. 14*) must be provided for fastening of the contactors.
- ▶ The mounting holes can be either:
 - threaded holes (for threaded screws)
 - or through holes (for threaded screws and nuts)
- ▶ Fastening of the contactors on the mounting plate is performed using 4 M6 mounting screws.
 - The length of the mounting screws must be determined dependent on the structural circumstances.
 - To secure the mounting screws so that they do not come loose, appropriate screw locking elements must be provided. Schaltbau recommends using Schnorr washers (or similar).
 - The mounting screws must be equipped with washers (resting on the device). Installation without washers is not permitted!
 - The mounting screws (and if applicable the nuts) must be strength class 8.8 or higher.
 - The mounting screws must be tightened to the specified torque, which depends on the strength class (min. 8.8) of the screws/nuts used.

8.1.3 Mounting holes

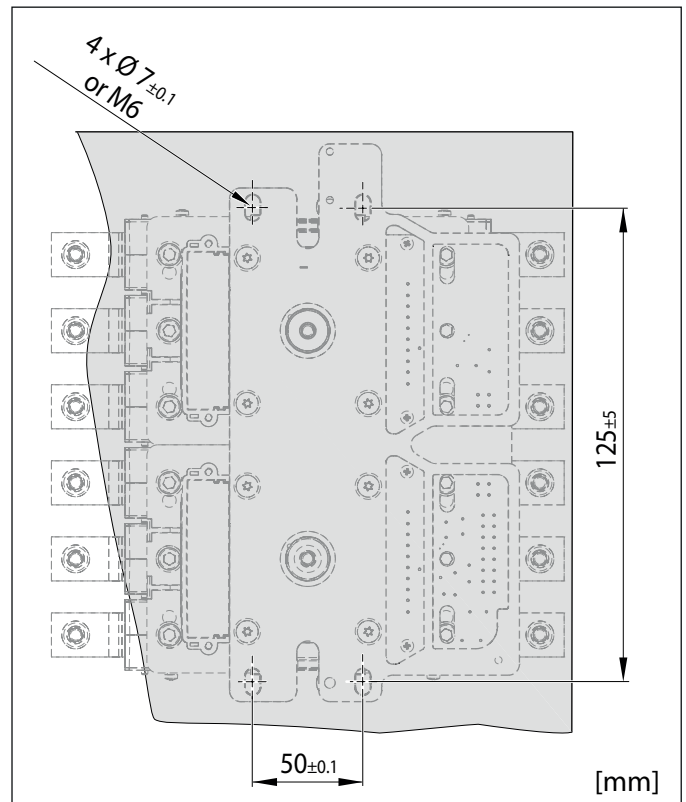


Fig. 13: Dimensions and layout of mounting holes for coil drive wide (dimensions not to scale)

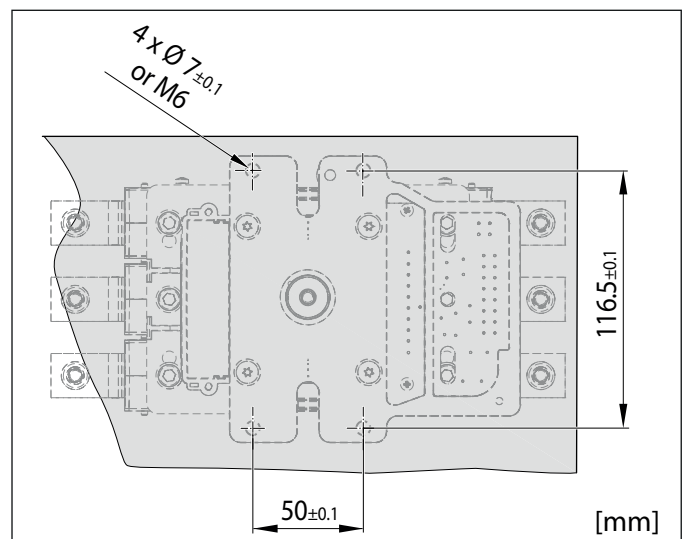


Fig. 14: Dimensions and layout of mounting holes for coil drive small (dimensions not to scale)

8.1.4 Mounting positions

The contactors are designed for horizontal or vertical mounting. Examples of correct mounting positions are presented in *Fig. 15* and *Fig. 16* (under A and B). Mounting positions, suspended overhead, as shown in *Fig. 15* and *Fig. 16* (under C), are not permitted.

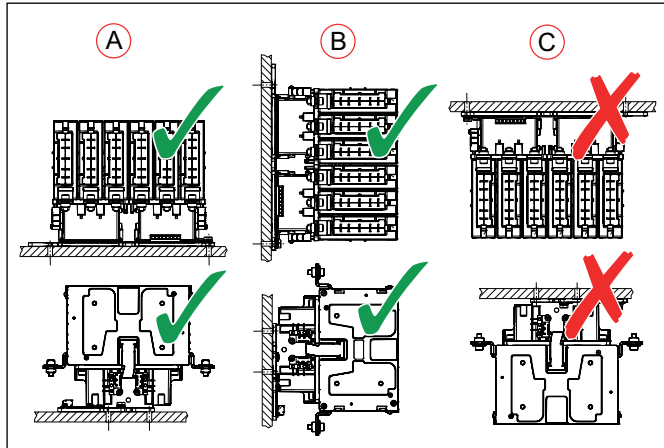


Fig. 15: For wide coil drives: Examples of correct mounting positions (A and B) and non-permitted mounting positions (C).

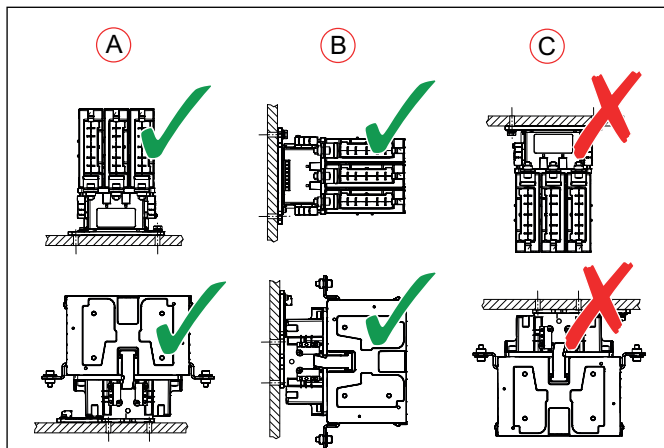


Fig. 16: For small coil drives: Examples of correct mounting positions (A and B) and non-permitted mounting positions (C).

8.1.5 Required minimum clearances

ATTENTION

Switching of high voltage currents produces electric arcs and it is possible that plasma will escape from the openings of the arc chambers. Therefore, it is extremely important to maintain the minimum clearances to ground/earth and the connecting contacts to avoid flash-overs.

- ▶ The required minimum clearance to earth potential and insulating structure parts can be found in our *C60 catalogue*. The *catalogue* is available under: <https://www.schaltbau.com/en/media-library/>

ATTENTION

Make sure that there is sufficient space for routing the wires for auxiliary switches and coil terminals. Otherwise, if the wires are routed too tightly, the auxiliary switch connections and/or coil terminals can break off or bend.

8.1.6 Ventilation requirements

- ▶ Ensure sufficient ventilation in the installation area, especially when switching heavy loads. This allows the plasma to be dissipated more quickly and reduces the risk of flash-over and corrosion.

8.1.7 Safety

- ▶ Installation must be performed by qualified trained personnel.

ATTENTION

When installing, ensure that no dirt can get into the contactor as a result of surrounding building activities.

ATTENTION

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of undoing of the screws in the work log.
- ▶ Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

8.1.8 Tools required

- Socket spanner set, Open-ended spanner set, hexagon socket spanner set, hexagon socket bits (depending on the screws used)
- Torque spanner

8.1.9 Installing the contactor

- ▶ Ensure that the contact surfaces on the mounting plate/frame (3) and the bottom of the contactor (1) are free from dirt and other contamination (e.g. metal chips).
- ▶ Position the contactor (1) on the mounting plate/frame (3) which is provided with mounting holes.
- ▶ Screw the contactor (1) on the mounting flange to the mounting plate/frame (3) using 4 mounting screws M6 including washers (2).
 - In designs with the mounting holes implemented as threaded holes, screw the mounting screws into the holes directly, not forgetting the washers.
 - In designs with through holes, fit the mounting screws and washers and tighten the screws using suitable screw locking elements and nuts.
- ▶ Tighten the mounting screws to the specified torque, which depends on the strength class (min. 8.8) of the screws/nuts used.

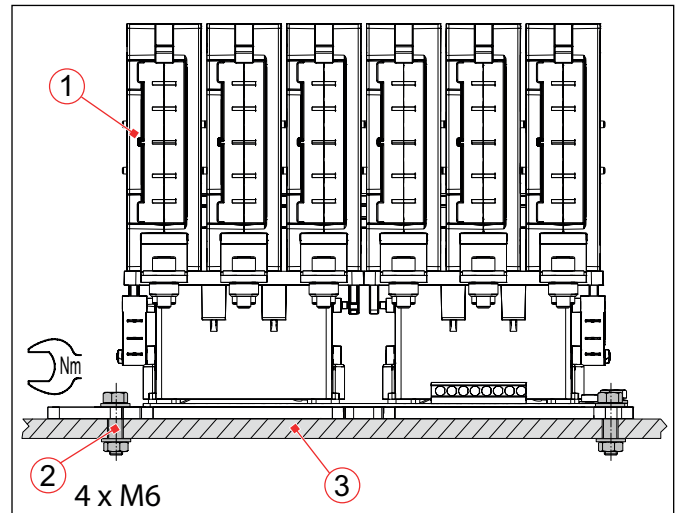


Fig. 17: Installing the contactor on the mounting plate or frame (example for wide coil drives)

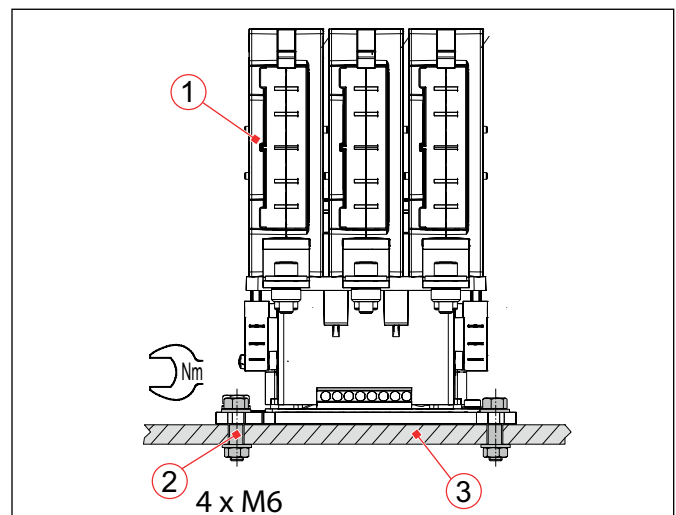


Fig. 18: Installing the contactor on the mounting plate or frame (example for small coil drives)

8.2 Electrical connection

8.2.1 Electrical data and other technical specifications

For the power consumption of the coil drive system and electrical data of the auxiliary switches as well as other technical specifications, refer to the respective data sheets and to our *C60 catalogue*.



The *catalogue* is available under:

<https://www.schaltbau.com/en/media-library/>

8.2.2 Preparatory measures

- ▶ The minimum clearances to live and earthed parts are given in the corresponding data sheets or in our *C60 catalogue* and must be adhered to. The catalogue is available under:
<https://www.schaltbau.com/en/media-library/>
- ▶ Switching of high voltage currents produces electric arcs and it is possible that plasma will escape from the openings of the arcing chambers. Therefore, it is extremely important to maintain the minimum clearances to live and earthed parts to avoid flashovers. These minimum clearances have been tested and specified in relation to the switching capacity of the contactors.
- ▶ The earth connecting cable must be fitted with an appropriate ring terminal (for M6 terminal screw).
- ▶ The earth terminal screw must be tightened to a torque of 6.4 - 8 Nm.
- ▶ Undersized conductor cross-sections for the earth connection may produce a safety hazard.
- ▶ Connection of the main power circuit can be implemented with cables or busbars.
- ▶ The minimum conductor cross-sections for the main terminal connection and the earth connection must be observed.
- ▶ If connecting cables are used for the main power circuit, they must be selected taking into consideration the insulation class and the ambient conditions.
- ▶ If connecting cables are used for the main power circuit, they must be fitted with appropriate ring terminals (for M8 terminal screws).
- ▶ The ring terminals used must not be wider than the fixed contacts.
- ▶ The ring terminals must be insulated so that they cannot touch each other.
- ▶ If busbars are used for the main power circuit, they must not be wider than the fixed contacts.
- ▶ To secure the main terminal screws so that they do not come loose, appropriate screw locking elements must be provided. Schaltbau recommends using Schnorr washers (or similar).
- ▶ The main terminal screws must be tightened to a torque of 8 - 10 Nm.
- ▶ The connections for the auxiliary switches are made with flat plugs. Consequently, the control wires must be equipped with corresponding flat receptacles 6.3 x 0.8 mm.
- ▶ The maximum permissible conductor cross-section of the auxiliary contact control wires is 1 mm² / AWG 18 stranded wire.
- ▶ A receptacle spring clamp terminal block is provided for the coil control wires. The control wires for the coil connection must be stripped accordingly (if necessary, fit with appropriate wire end sleeves).
- ▶ For the power consumption of the coil drive system and the electrical data of the auxiliary switches refer to our catalogues:
 - **C60** (Catalogue CF series devices)
 - **D70** (Catalogue auxiliary switches S870)

8.2.3 Safety

 DANGER	
	<p>The contactors are used for high voltage switching. Contact with live electrical parts can result in serious injuries or even death!</p> <p>Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists.</p> <p>Before starting any work on the contactors, always comply with the following safety rules:</p>
	<ul style="list-style-type: none">▶ Disconnect on all sides▶ Secure to prevent switching back on▶ Clearly identify the working area▶ Check that a voltage-free state exists▶ Earth and short circuit; this includes discharging any capacitors in the main circuit▶ Beside the main power circuits, also disconnect additional and auxiliary circuits▶ Cover or insulate adjacent live parts▶ The presence of a voltage-free state can only be clearly identified by a qualified electrician.▶ When the work has been concluded, follow the procedure in reverse.

ATTENTION
<p>Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.</p> <ul style="list-style-type: none">▶ Record the frequency of undoing of the screws in the work log.▶ Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

8.2.4 Tools required

- Socket spanner set
- Open-ended spanner set
- Torque spanner
- Continuity tester
- Cable ties

8.2.5 Connecting the auxiliary switches

The control wires for the auxiliary contacts must be fitted with receptacles (6.3 x 0.8 mm).

ATTENTION
 Make sure that according to the insulation coordination there is sufficient clearance between the wires of the control voltage and the main connections.

ATTENTION

- ▶ The maximum permissible conductor cross-section of the auxiliary contact control wires is 1 mm² / AWG 18 stranded wire.
- ▶ Bending of the connection terminals on the auxiliary switches is not permitted!
- ▶ Move and route the control wires and receptacles only in the direction of plugging, see *Fig. 19* to *Fig. 20*.
- ▶ Mechanically secure the control wires to minimise feedback effects of forces caused by the wires (e. g. shock, vibrations) acting on the terminals.

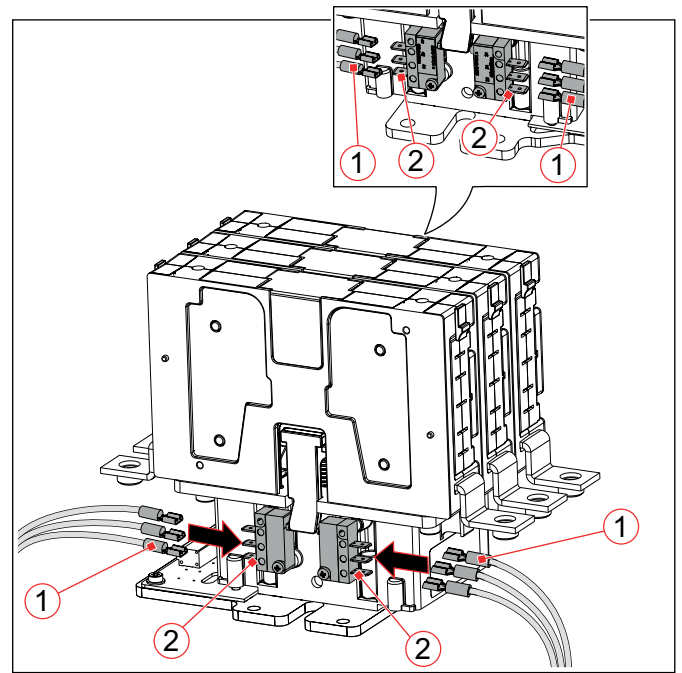


Fig. 20: Connecting the auxiliary switches (small coil drives)

- ▶ Route the control wires to the terminals of the auxiliary switches (1).
- ▶ Plug the pre-assembled control wires with the receptacles (1) to the terminals (2).
- ▶ Check the routing of the wiring. Wires must not be squeezed or bent.
- ▶ If applicable bundle and secure the wires using cable ties.

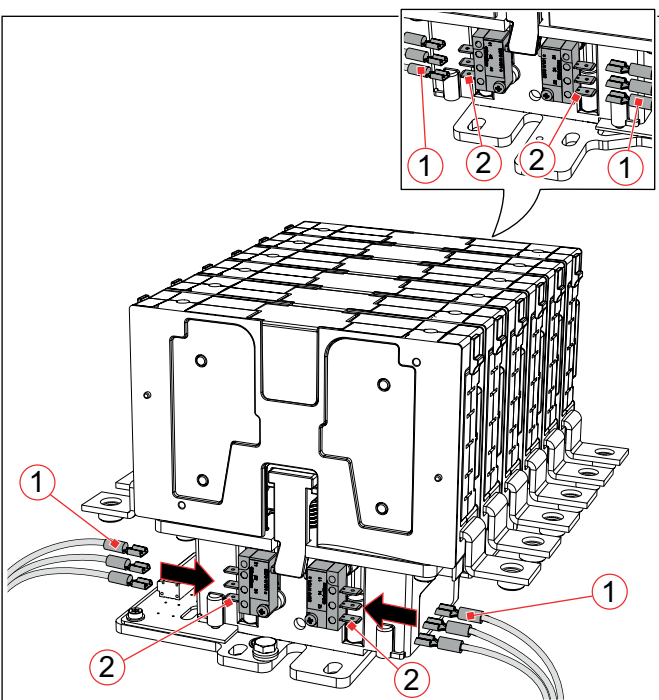


Fig. 19: Connecting the auxiliary switches (wide coil drives)

8.2.6 Connecting the coil

ATTENTION

The value of the overvoltage limitation is part of the magnetic system and must not be modified and in particular not be short-circuited (e.g. by an external diode).

- ▶ Make sure that no such diode is used in your control circuit.

ATTENTION

- ▶ Mechanically secure the control wires to minimise feedback effects of forces caused by the wires (e. g. shock, vibrations) acting on the terminals.

A spring clamp terminal block (2) is provided for the coil control wires. The control wires for the coil connection must be stripped accordingly (if necessary, fit with appropriate wire end sleeves).

- ▶ Route the coil control wires (1) to the spring clamp terminal block (2).
- ▶ Press and hold the actuating elements (3) of the spring clamp terminal block.
- ▶ Connect the coil control wires to the designated cage clamps according to the wiring diagram label attached to the device. The polarity (+/-) need not be observed.
- ▶ Release the actuating elements (3).
- ▶ (Even if you want to disconnect the control wires, you must always press the actuating elements (3)).
- ▶ Check that the coil control wires are correctly installed
- ▶ Check the routing of the wiring. Wires must not be squeezed or bent.
- ▶ If applicable bundle and secure the wires using cable ties.

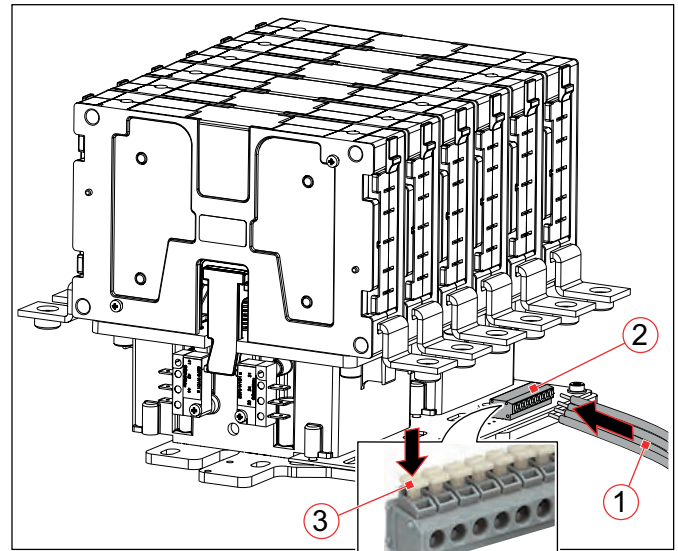


Fig. 21: Connecting the coil (wide coil drives)

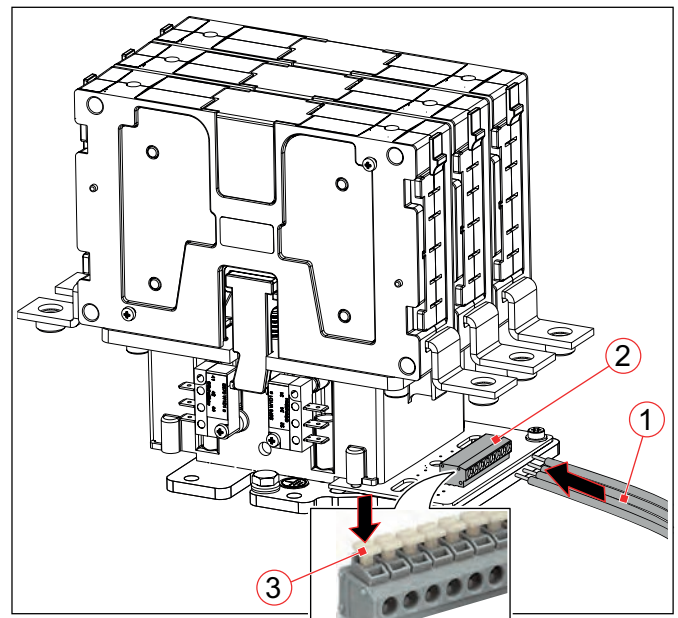


Fig. 22: Connecting the coil (small coil drives)

8.2.7 Connecting the earth terminal

The earth connecting cable must be fitted with an appropriate ring terminal (for M6 terminal screw).

- ▶ Connect an earthing cable to the earth terminal (3) which is provided on the mounting flange of the contactor.
- ▶ Screw the ring terminal (4) of the earthing cable in place using the terminal screw (1) and suitable screw locking elements (2).
 - Schaltbau recommends using Schnorr washers (or similar).
- ▶ Tighten the earth terminal screw (1) to a torque of 6.4 - 8 Nm.

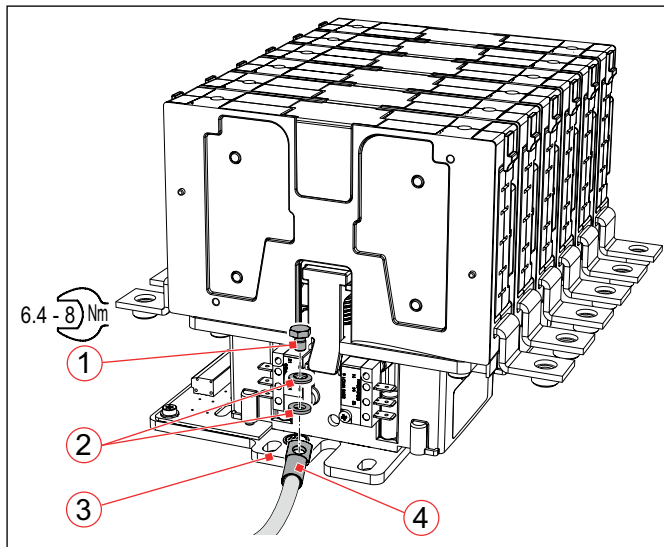


Fig. 23: Connecting the earth terminal (wide coil drives)

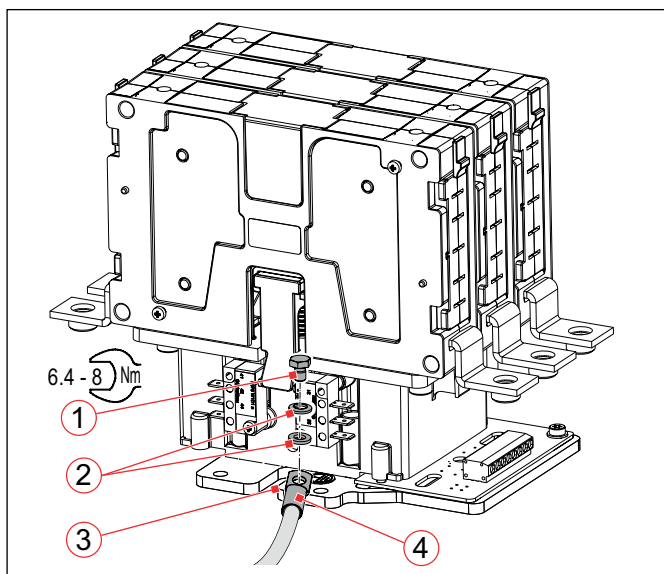


Fig. 24: Connecting the earth terminal (small coil drives)

8.2.8 Connecting the main contacts

ATTENTION

Ensure that the connection points for the main contacts are free from corrosion.

ATTENTION

For DC contactor types, make sure to observe the correct polarity.

ATTENTION

- Ensure sufficient distance between the main terminals and between the pole plates and main terminals in accordance with the insulation coordination standards.
- Depending on the contactor configuration and installation situation, insulating plates may be required between two closely spaced switching elements and on the two outer sides of the contactor (insulating plates are mandatory for 3.000 V contactors).

Connection examples using cables

The connecting cables of the main power circuit must be fitted with appropriate ring terminals (for M8 terminal screws).

ATTENTION

- The ring terminals used must not be wider than the main contacts.
- The ring terminals must be insulated so that they cannot touch each other.

Examples for the connection with cables are shown in Fig. 25 to Fig. 30.

- ▶ Route the pre-assembled connecting cables to the main contacts (4).
- ▶ Screw the ring terminals (1) in place from above using the terminal screws (3) and suitable screw locking elements (2).
 - Schaltbau recommends using Schnorr washers (or similar).
- ▶ Tighten the terminal screws (3) to a torque of 8 - 10 Nm.

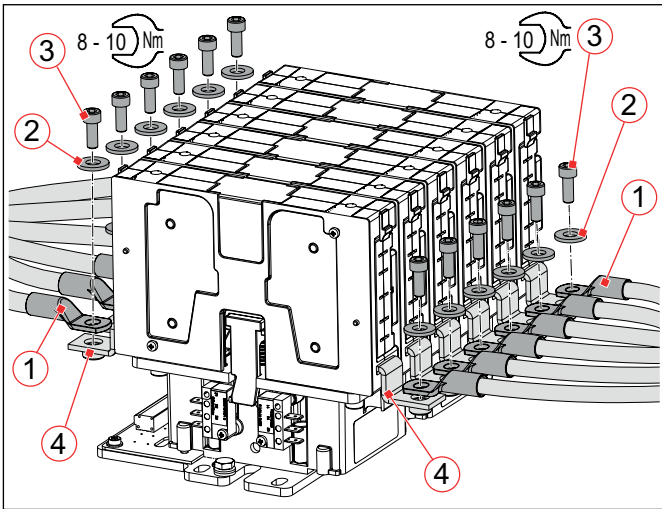


Fig. 25: Connecting the main contacts with cables:
Connection example for NO contactors with wide coil drives

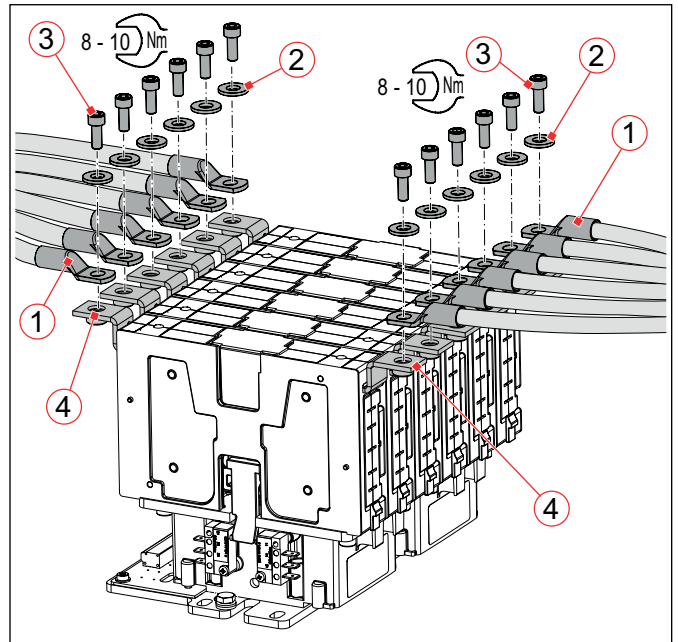


Fig. 27: Connecting the main contacts with cables:
Connection example for NC contactors with wide coil drives

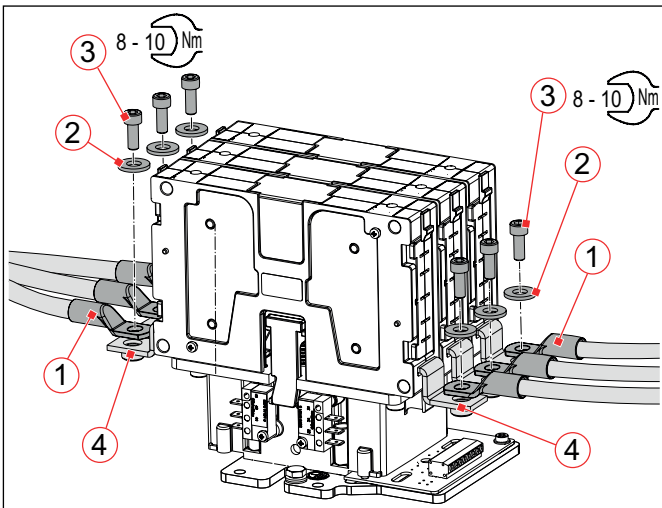


Fig. 26: Connecting the main contacts with cables:
Connection example for NO contactors with small coil drives

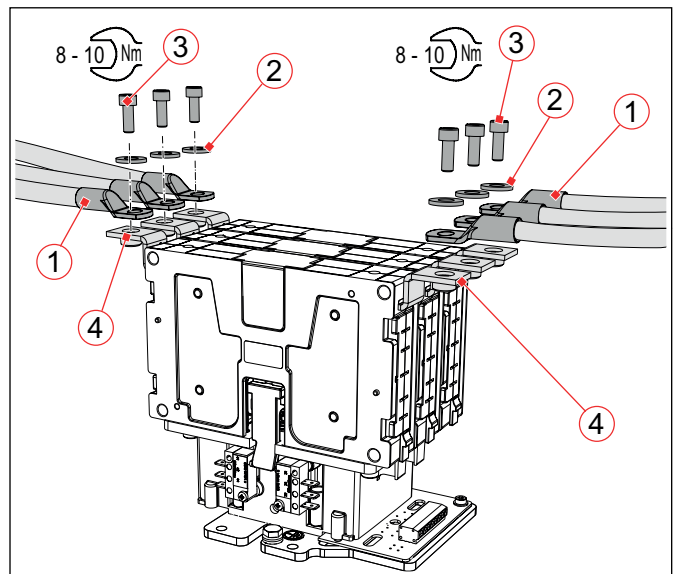


Fig. 28: Connecting the main contacts with cables:
Connection example for NC contactors with wide coil drives

Connection examples for changeover (CO) contactors using cables

With changeover contactors, the lower main contact of the NO switching element must be connected to the upper main contact of the NC switching element on one side. A connecting cable (6) with two ring cable lugs must be provided for this purpose.

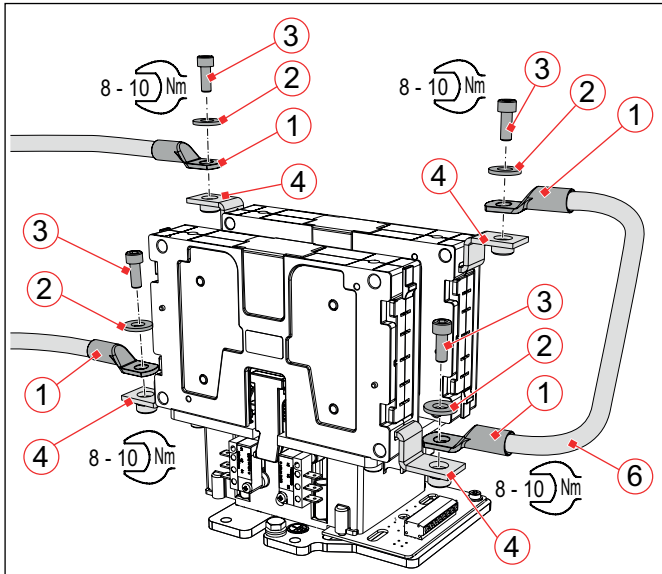


Fig. 29: Connecting the main contacts with cables:
Connection example for CO contactors with small coil drives

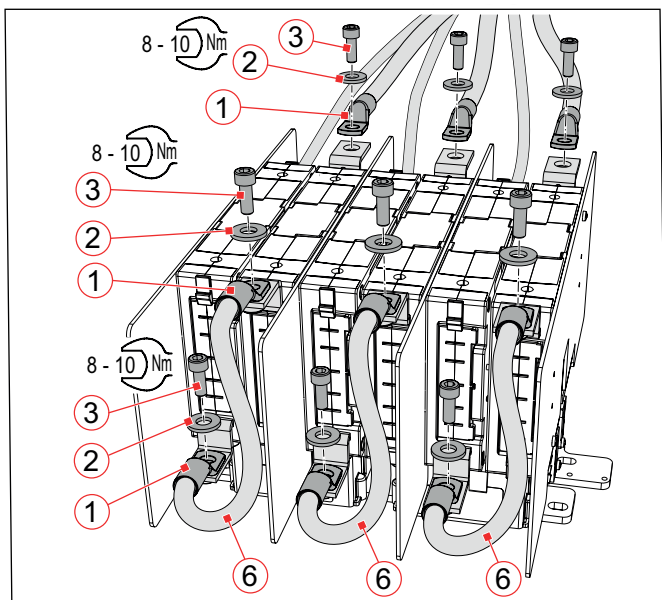


Fig. 30: Connecting the main contacts with cables:
Connection example for CO contactors with wide coil drives

Connection examples using busbars

As an alternative to connection using cables, the main power circuit can also be connected with busbars.

ATTENTION

- The busbars used must not be wider than the main contacts.

Examples for the connection with busbars are shown in **Fig. 31** to **Fig. 36**.

- ▶ Route the busbars (5) to the main contacts (4).
- ▶ Screw the busbars (5) in place from above using the terminal screws (3) and suitable screw locking elements (2).
 - Schaltbau recommends using Schnorr washers (or similar).
- ▶ Tighten the terminal screws (3) to a torque of 8-10 Nm.

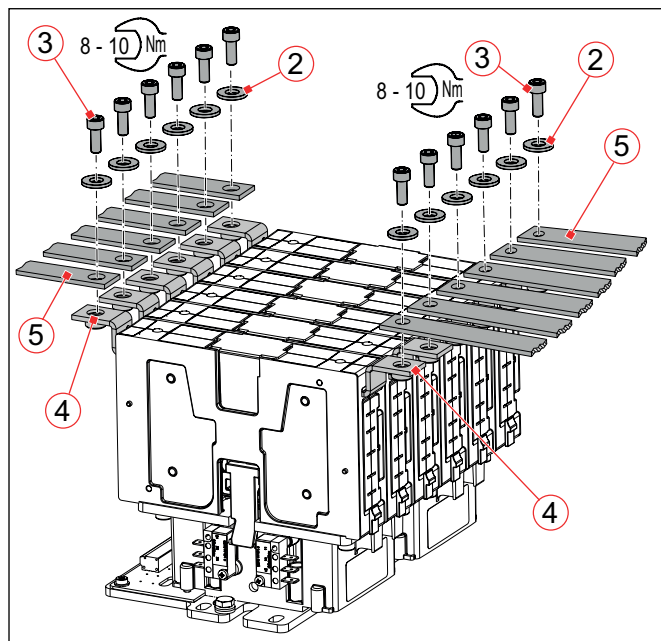


Fig. 33: Connecting the main contacts with busbars: Connection example for NC contactors with wide coil drives

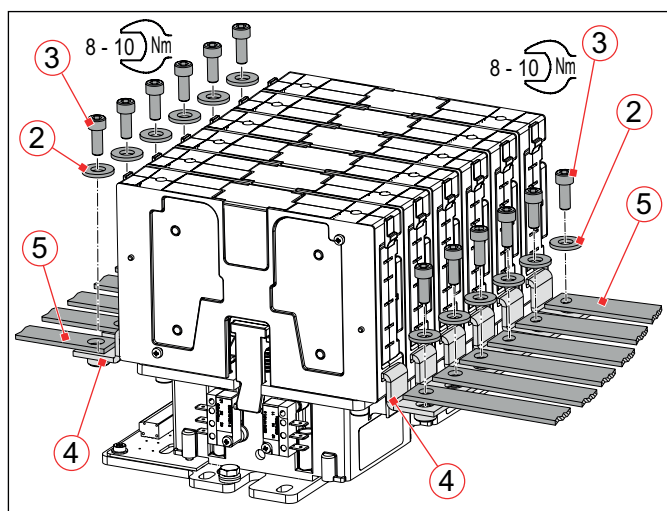


Fig. 31: Connecting the main contacts with busbars: Connection example for NO contactors with wide coil drives

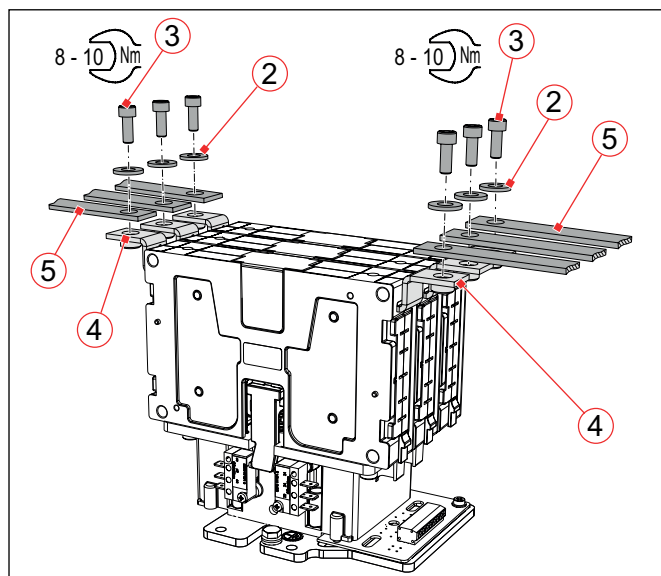


Fig. 34: Connecting the main contacts with busbars: Connection example for NC contactors with small coil drives

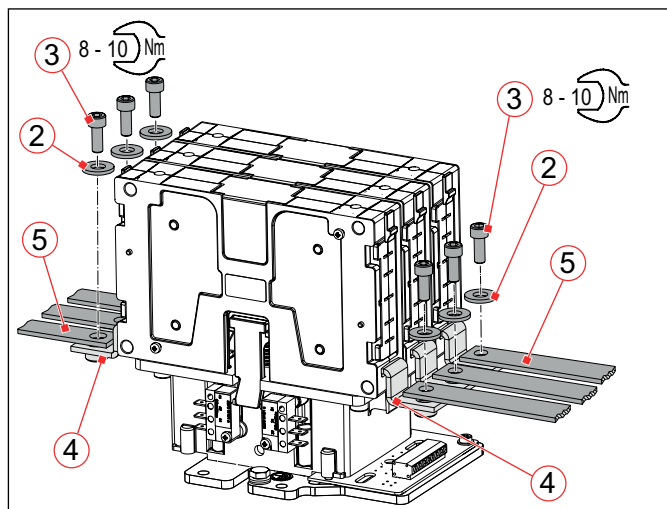


Fig. 32: Connecting the main contacts with busbars: Connection example for NO contactors with small coil drives

Connection example for changeover (CO) contactors using busbars

With changeover contactors, the lower main contact of the NO switching element must be connected to the upper main contact of the NC switching element on one side. For this purpose, a Z-shaped busbar (7) must be provided.

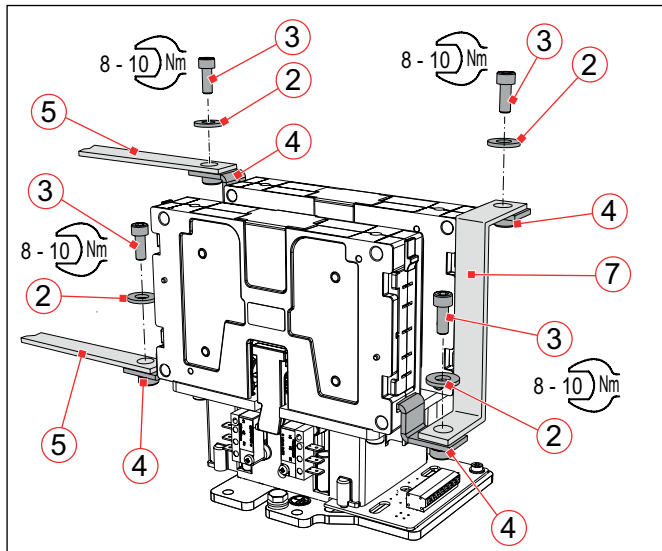


Fig. 35: Connecting the main contacts with busbars:
Connection example for CO contactors with small coil drives

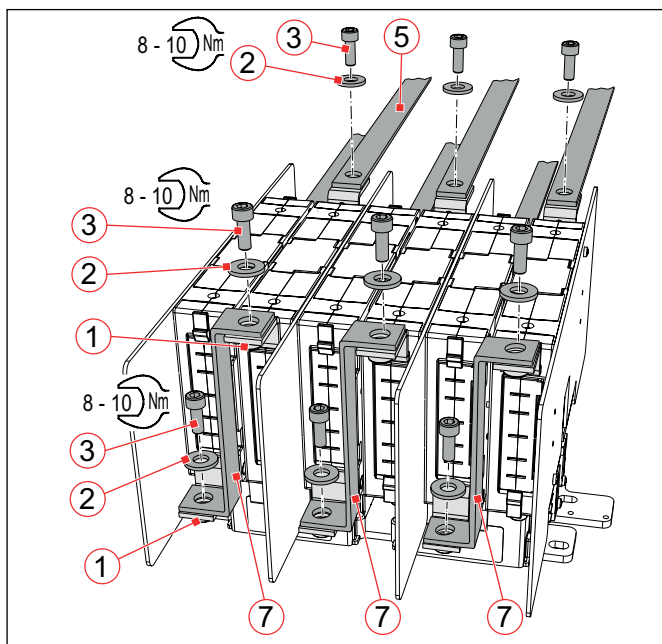


Fig. 36: Connecting the main contacts with busbars:
Connection example for CO contactors with wide coil drives

8.3 Checks


After every installation and after maintenance work, perform the following checks:

- ▶ Check that the contactors are correctly installed on the mounting plate/frame and tightly screwed in place.
- ▶ Check that the main circuit cables or busbars are correctly installed and fit tightly at the main contacts.
- ▶ For DC contactor types, check that the correct polarity of the main circuit connection is observed.
- ▶ Check correct connection and tight fit of the earthing cable.
- ▶ Check that all insulating plates (if applicable) are undamaged and firmly fixed.
- ▶ Check that the control wires of the coil terminals are correctly installed.
- ▶ Check that the control wires are correctly connected to the auxiliary switches.
Check the correct assignment and function of the auxiliary switches using a continuity tester.
- ▶ Switch the contactor several times without activating the main power circuit.
- ▶ Check the pull-in and drop-off voltage based on the Schaltbau specifications. See **C60 catalogue**.
- ▶ Check the routing of the wiring. Wires must not be squeezed or bent. If applicable bundle and secure wires using cable ties.
- ▶ Label stickers are supplied with new spare parts, e.g. switching elements, auxiliary switches, etc. Check whether these label stickers are attached to all parts according to the configuration of the present contactor.
- ▶ After every installation or after maintenance, check the contactor for correct operation in accordance with the following standards:
 - EN/IEC 60077-2
 - EN/IEC 60947-4-1

9. Maintenance

Note the expert knowledge which is essential for carrying out maintenance work, which is referred to in chapter "2. General and safety information".

9.1 Safety

	⚠ DANGER
	<p>The contactors are used for high voltage switching. Contact with live electrical parts can result in serious injuries or even death!</p> <p>Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists.</p> <p>Before starting any work on the contactors, always comply with the following safety rules:</p> <ul style="list-style-type: none"> ▶ Disconnect on all sides ▶ Secure to prevent switching back on ▶ Clearly identify the working area ▶ Check that a voltage-free state exists ▶ Earth and short circuit; this includes discharging any capacitors in the main circuit ▶ Besides the main power circuits, also disconnect additional and auxiliary circuits ▶ Cover or insulate adjacent live parts ▶ The presence of a voltage-free state can only be clearly identified by a qualified electrician. ▶ When the work has been concluded, follow the procedure in reverse.

9.2 Preventive maintenance

Contactors of the CF series are maintenance-free within the rated mechanical life time. The electrical life time depends on the number of switching cycles under heavy load conditions and may vary for different applications. In normal use, this corresponds to a decade-long operating period.


If the contactors are operated in a particularly dirty environment, the visual checks should be performed at shorter intervals. Dirt can impair the clearance and creepage distances, which can result in a shorter service life or to a malfunction.

9.2.1 Intervals for regular tests/checks

To ensure the correct function and a prolonged operational life span of the contactors, the following checks and maintenance must be regularly performed.

Extraordinary checks need only be carried out if there has been a significant and extraordinarily high recorded number of switching cycles under short-circuit conditions.

Test/check	Interval
External visual inspection of the contactor	▶ 1x per year
Check of the main contacts (both, stationary and moving contact bridge)	▶ 1x to 2x per year
Check of the auxiliary switches	▶ Every 2 years

	⚠ DANGER
	<p>If damage to the contactor or cables is visible, the safety of the contactor is no longer guaranteed.</p> <ul style="list-style-type: none"> ▶ Immediately submit any damaged contactors or components for maintenance.

ATTENTION

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of undoing of the screws in the work log.
- ▶ Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

9.2.2 Regular tests/checks

All of the maintenance activities that may be carried out on the contactors by skilled personnel are listed below.

Component	Tests/checks	Measures
Cables/busbars	Check for: <ul style="list-style-type: none"> ▶ damaged cables, cable lugs ▶ damaged insulation ▶ corrosion ▶ damaged busbars ▶ kinked or crushed cables ▶ loose or missing fastening elements ▶ correct tightening torque of the terminal screws 	In case of faults: <ul style="list-style-type: none"> ▶ immediately replace damaged cables or cable lugs ▶ immediately replace damaged busbars ▶ remove corrosion and replace corroded parts ▶ tighten loose fastening elements immediately replace missing fastening elements ▶ tighten the terminal screws to the rated torque
Earthing cable	Check for: <ul style="list-style-type: none"> ▶ damaged cable, cable lug ▶ damaged insulation ▶ corrosion ▶ kinked or crushed cable ▶ loose or missing fastening elements ▶ correct tightening torque of the earthing terminal screw 	In case of faults: <ul style="list-style-type: none"> ▶ immediately replace a damaged cable or cable lug ▶ remove corrosion and replace corroded parts ▶ tighten loose fastening elements immediately replace missing fastening elements ▶ tighten the earthing terminal screw to the rated torque
Base plate/mounting flange	Check for: <ul style="list-style-type: none"> ▶ loose or missing fastening elements 	In case of faults: <ul style="list-style-type: none"> ▶ tighten loose fastening elements immediately ▶ replace missing fastening elements ▶ tighten a loose contactor immediately

Component	Tests/checks	Measures
Switching elements	Check for: <ul style="list-style-type: none"> ▶ dirt ▶ damage or wear on the housing ▶ loose or missing covers ▶ loose or missing fastening elements 	In case of faults: <ul style="list-style-type: none"> ▶ remove any dirt that may be present ▶ if the housing of a switching element is damaged or heavily worn replace the entire switching element, see section <i>“9.3.2 Replacing the switching elements”</i> ▶ adjust the cover in correct position and firm seating, replace missing covers immediately ▶ tighten loose switching elements immediately replace missing fastening elements
Arcing chamber inserts	Check for: <ul style="list-style-type: none"> ▶ dirt ▶ damage or wear ▶ traces of combustion residue (slight soot deposits permitted) ▶ correct and firm seating of the arcing chamber inserts in the switching elements ▶ correctly engaged latching button 	In case of faults: <ul style="list-style-type: none"> ▶ remove any dirt that may be present ▶ if the housing is damaged or heavily worn replace the arcing chamber inserts, see section <i>“9.3.1 Replacing the arcing chamber inserts”</i> ▶ if there are holes in the housing walls, replace the arcing chamber inserts ▶ adjust the arcing chamber inserts in correct position and firm seating ▶ make sure that the arcing chamber inserts are latched securely
Main contacts (both stationary contacts and moving contact bridge)	Prior to checking the main contacts, the arcing chamber must first be removed, see section <i>“9.2.3 Removing the arcing chamber inserts”</i> . Thereafter, the main contacts are accessible and can be checked for: <ul style="list-style-type: none"> ▶ damage or wear ▶ traces of combustion residue (slight soot deposits permitted) <p>A certain level of experience is required to assess the state of the contacts. Even after a few load switching cycles, to a lay user the contacts appear worn and the surroundings fouled. Replacement of the contactor is only necessary after more than 70% of the contact material is burnt through.</p>	In case of faults: <ul style="list-style-type: none"> ▶ if more than 70% of the contact material is burnt through, replace the switching element as a whole unit, see section <i>“9.3.2 Replacing the switching elements”</i>
Auxiliary switches	Check for: <ul style="list-style-type: none"> ▶ dirt ▶ damage or wear on the housing ▶ signs of short circuits <p>The auxiliary switches can be accessed from the outside for a simple visual inspection. Under normal working condition (there have been no short circuits in the control circuit) the life time of the auxiliary switches exceeds those of the contactor.</p>	In case of faults: <ul style="list-style-type: none"> ▶ replace the auxiliary switch, see section <i>“9.3.3 Replacing the auxiliary switches”</i>
Coil drive unit	Check for: <ul style="list-style-type: none"> ▶ dirt ▶ damage or heavy wear ▶ damage due to operation with impermissible, too high coil voltage 	In case of faults: <ul style="list-style-type: none"> ▶ if damaged or heavily worn, replace the complete coil drive unit

9.2.3 Removing the arcing chamber inserts

⚠
DANGER

Before beginning any work on the contactors, make sure that

- ▶ there is no voltage present,
- ▶ all safety regulations are fully observed.
- ▶ Be sure to observe section "9.1 Safety" on page 33.

Prior to the following tests/checks, the arcing chamber inserts must be removed from the switching element:

- Checking the main contacts for wear (both stationary contacts and moving contact bridge)
- Checking the arcing chamber inserts for wear

- ▶ Slide the latching button (1) upwards and hold it in place.
- ▶ Remove the arcing chamber insert (2) from the switching element.
- ▶ Remove the other arcing chamber inserts one after the other in the same way.

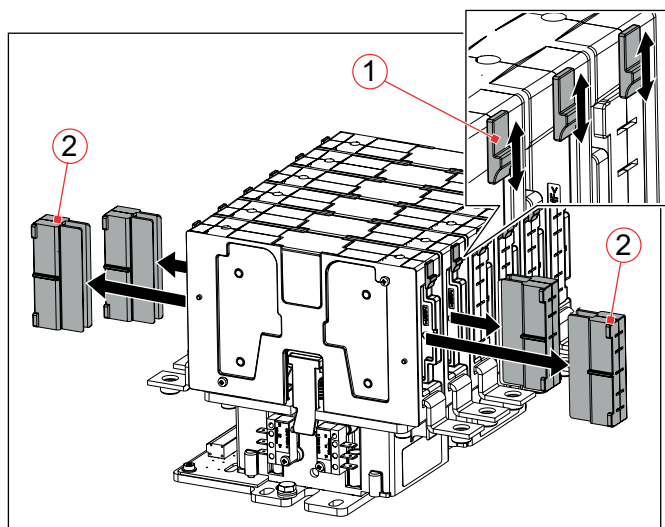


Fig. 37: Removing the arcing chamber inserts (example for contactors with wide coil drives)

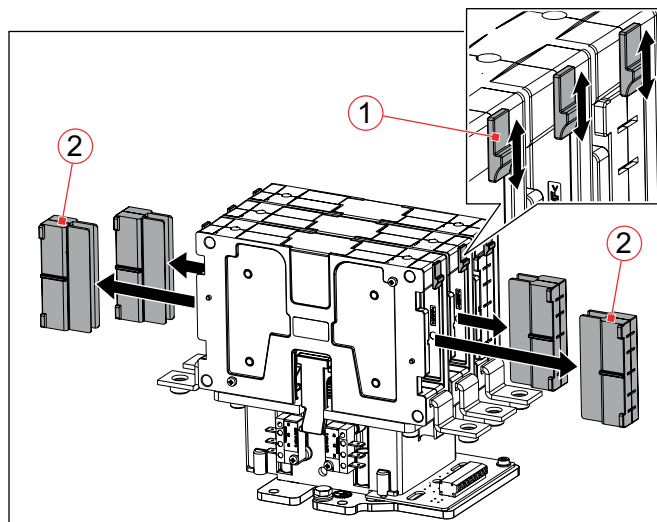


Fig. 38: Removing the arcing chamber inserts (example for contactors with small coil drives)

9.2.4 Inserting the arcing chamber inserts

- ▶ Slide the latching button (1) upwards and hold it in place.
- ▶ Push the arcing chamber insert (2) into the housing of the switching element as far as it will go.
- ▶ Release the latching button (1).
- ▶ Insert the other arcing chamber inserts one after the other in the same way.
- ▶ Make sure that all arcing chamber inserts are latched securely.

9.2.5 Checking the arcing chamber inserts

Precondition

The arcing chamber inserts must be removed from the switching element. See section "9.2.3 Removing the arcing chamber inserts".

Procedure

- ▶ Check the arcing chamber inserts for:
 - broken parts of the housing (1)
 - burned through holes in the housing wall
- ▶ For inserts with metal arcing plates (B), additionally check for burnt-off arcing plates (2).
- ▶ In the case of ceramic inserts (C), additionally check for broken-out areas on the ceramic rollers (3).
- ▶ If the arcing chamber insert is damaged or heavily worn replace the complete insert, see "9.3.1 Replacing the arcing chamber inserts".

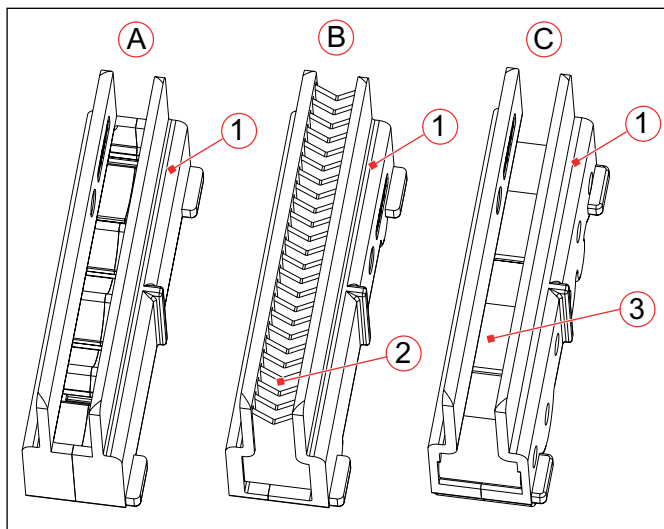


Fig. 39: Checking the arcing chamber for wear

- C Plastic arcing chamber insert
- B Arcing chamber insert with metal arcing plates
- C Ceramic arcing chamber insert

9.2.6 Checking the main contacts

Precondition

The arcing chamber insert must be removed from the switching element. See section "9.2.3 Removing the arcing chamber inserts".

Tools required

- Inspection mirror

Procedure

- ▶ Check the main contacts. In doing so
 - check both the stationary contacts (1),
 - as well as the contacts (2) on the underside of the moving contact bridge.
- ▶ To get a better view of the contacts use an inspection mirror.
- ▶ If more than 70% of the contact material is burnt through, replace the switching element as a whole unit, see "9.3.2 Replacing the switching elements".

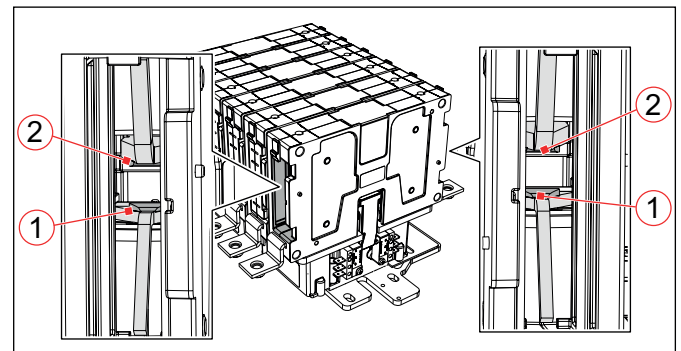


Fig. 40: Checking the main contacts for wear (example for contactors with wide coil drives)

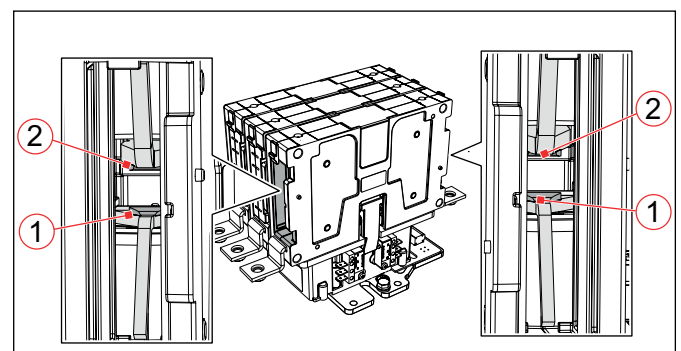



Fig. 41: Checking the main contacts for wear (example for contactors with small coil drives)

9.3 Corrective maintenance

The contactors are largely maintenance-free. Therefore there is no general requirement to replace parts during its service life. Excepted from this are arcing chamber inserts, entire switching elements and auxiliary switches.

9.3.1 Replacing the arcing chamber inserts

	⚠ DANGER
	<p>Before beginning any work on the contactors, make sure that</p> <ul style="list-style-type: none"> ▶ there is no voltage present, ▶ all safety regulations are fully observed. ▶ Be sure to observe section "9.1 Safety" on page 33.

If arcing chamber inserts have to be replaced, always replace all arcing chamber inserts of the contactor.

- ▶ Remove the arcing chamber inserts. See section **"9.2.3 Removing the arcing chamber inserts"**.
- ▶ Insert the new arcing chamber inserts into the switching elements. See section **"9.2.4 Inserting the arcing chamber inserts"**.
- ▶ Make sure that the arcing chamber inserts are latched securely.

9.3.2 Replacing the switching elements

If switching elements have to be replaced, always replace all switching elements of the contactor. Label stickers are supplied with the new switching elements. Attach these Label stickers to the switching elements according to the configuration of the present contactor.


Tools required

- Socket spanner set, hexagon nuts
- Torque spanner

Precondition

The main contacts are disconnected, see **"8.2.8 Connecting the main contacts"**.

Removing the switching elements

	⚠ DANGER
	<p>Before beginning any work on the contactors, make sure that</p> <ul style="list-style-type: none"> ▶ there is no voltage present, ▶ all safety regulations are fully observed. ▶ Be sure to observe section "9.1 Safety" on page 33.

- ▶ Unscrew the fixing screws (2) and remove them including the washers (3).
- ▶ Remove the switching element (1) to the side.
- ▶ Remove the other switching elements (1) one after the other in the same way.

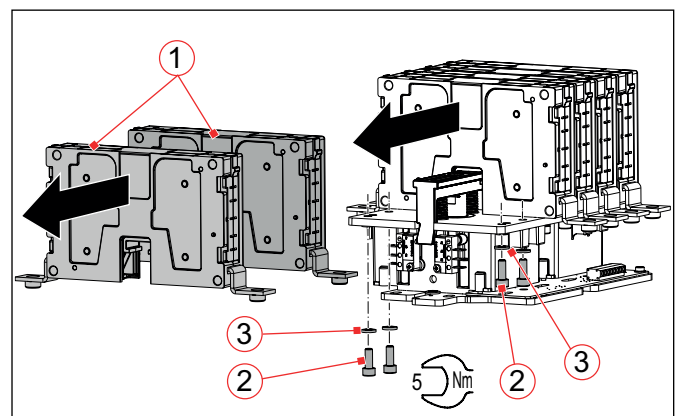


Fig. 42: Replacing the switching elements (example for contactors with wide coil drives)

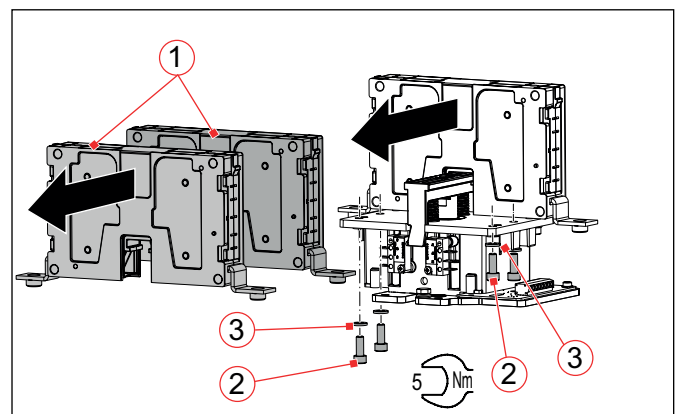


Fig. 43: Replacing the switching elements (example for contactors with small coil drives)

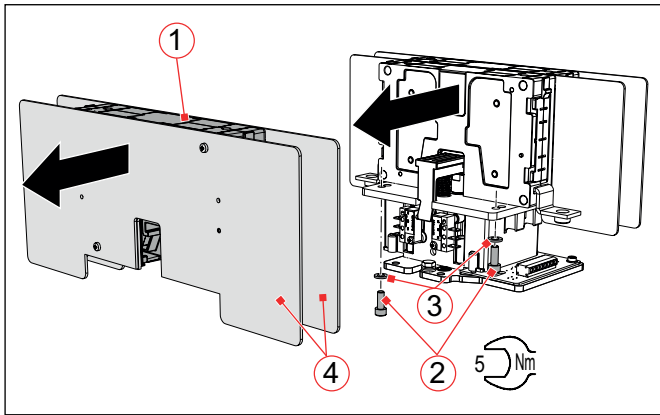


Fig. 44: Replacing the switching elements (example for contactors with small coil drives and insulating plates (4))

Installing the switching elements

- ▶ Screw the new switching elements (1) in place using the fixing screws (2) including washers (3).
- ▶ Install the other switching elements (1) one after the other in the same way.
- ▶ Tighten all fixing screws (2) to a torque of 5 Nm.
- ▶ Reconnect the main contacts, see **“8.2.8 Connecting the main contacts”**.
- ▶ Finally, subject the contactor to a complete check as described in section **“8.3 Checks” on page 32**.

9.3.3 Replacing the auxiliary switches

Under normal working condition (there have been no short circuits in the control circuit) the auxiliary switches must be replaced after no more than one million actuations in accordance with this manual.

However, in the event of a short circuit in the control circuit, it is possible that auxiliary switches are damaged and must be replaced.


If auxiliary switches have to be replaced, always replace all auxiliary switches of the contactor.

Label stickers are supplied with the new auxiliary switches. Attach these label stickers to the new auxiliary switches according to the configuration of the present contactor.

Tools required

- Torx screwdriver set, torx bit set
- Torque spanner
- Continuity tester

Procedure

	<p>⚠ DANGER</p>
	<p>Before beginning any work on the contactors, make sure that</p> <ul style="list-style-type: none"> ▶ there is no voltage present, ▶ all safety regulations are fully observed. ▶ Be sure to observe section "9.1 Safety" on page 33.

To secure the auxiliary switch, use only the original plastic-self-tapping screws – do not use any screws with a standard/regular screw thread!

- ▶ Pull off the receptacles of the control wires from the auxiliary switches (2).
- ▶ Screw out the plastic-self-tapping screws (1) and remove the auxiliary switches (2).
- ▶ Position the new auxiliary switches (2) on the mounting so that the pin (3) on the coil drive housing slides into the second bore hole of the auxiliary switch.
- ▶ Lightly screw in the plastic-self-tapping screws (1).
- ▶ Check that the auxiliary switches (2) are level on the mounting and are not skewed.
- ▶ Tighten the two plastic-self-tapping screws (1) to a torque of 0.8 Nm.
- ▶ Plug the receptacles of the control wires back on to the contacts of the auxiliary switches (2).
- ▶ Check the correct connection of the control wires to the auxiliary switches.

- ▶ Use a continuity tester to check the correct assignment and correct function of the auxiliary switches.
- ▶ Finally, subject the contactor to a complete check as described in section "8.3 Checks" on page 32.

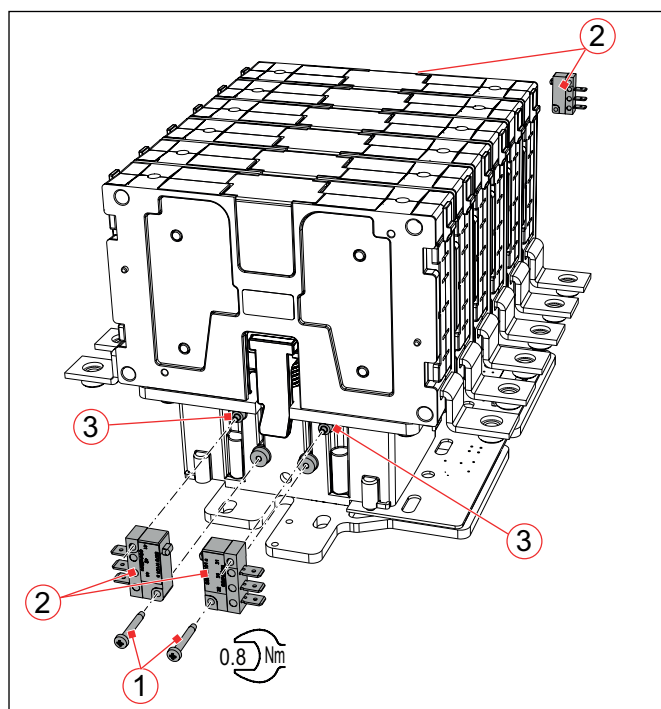


Fig. 45: Replacing the auxiliary switches (example for contactors with wide coil drives)

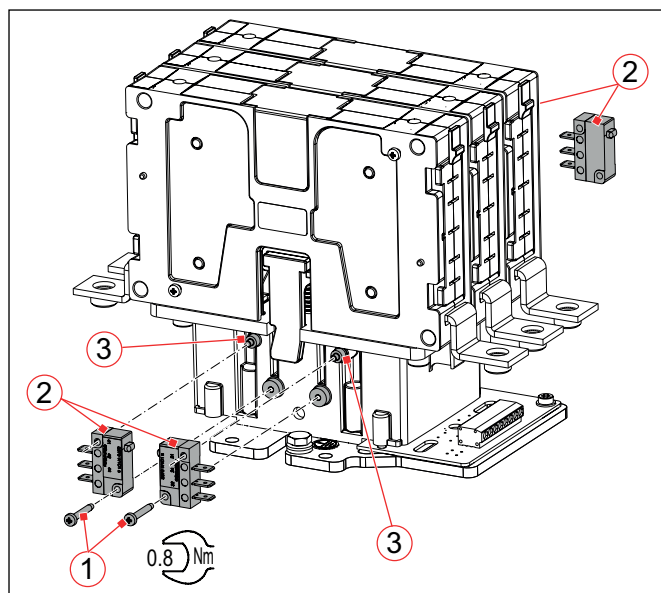


Fig. 46: Replacing the auxiliary switches (example for contactors with wide coil drives)

10. Spare parts



Important!

When ordering spare parts, always specify the precise type and article number of the contactor. You can find this data on the rating plate.

Spare part, designation	Quantity
CF Arcing chamber insert plastic, 200 and 300 A	2
CF Arcing chamber insert with metal arcing plates, 200 and 300 A	2
CF Arcing chamber insert ceramic, 200 and 300 A	2
CF Arcing chamber insert plastic, 400 A	4
CF Arcing chamber insert with metal arcing plates, 400 A	4
CF Arcing chamber insert ceramic, 400 A	4
CF Switching element complete, 200 A NO configuration	1
CF Switching element complete, 300 A NO configuration	1
CF Switching element complete, 200 A NC configuration	1
CF Switching element complete, 300 A NC configuration	1
CF Switching element complete, 400 A NO configuration	1
CF Switching element complete, 400 A NC configuration	1
Auxiliary switch S870 gold contacts	4
Auxiliary switch S870 silver contacts	4
CF Insulating plate	1
CF Coil drive wide, complete	1
CF Coil drive small, complete	1

11. Technical data

Technical data and information on the material properties for the contactors of the CF series are given in our *C60 catalogue*.

Schaltbau products are subject to continual improvement. Therefore, the product information in catalogues, data sheets, etc. may change at any time. Therefore, only the latest version of a catalogue is valid at any time – downloads available under:

<https://www.schaltbau.com/en/media-library/>

12. Disposal

This product is designed for exclusive professional use by commercial companies. The owner is responsible for ensuring an environmentally sound disposal of this product at the end of its working life.

This product or parts of it may not be disposed of with other household waste.

To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this product or parts of it from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Please observe all local regulations and recommendations for the disposal, recycling or environmentally friendly processing of the parts and materials that have been used or replaced during installation, operation, and maintenance tasks.

At the end of the product's useful life ensure environmentally sound disposal of the product according to the legal regulations and requirements for electrical and electronic waste equipment in your country.

Schaltbau GmbH

For detailed information on our products and services visit our website – or give us a call!

Schaltbau GmbH
Hollerithstrasse 5
81829 Munich
Germany



Phone +49 89 9 30 05-0
Fax +49 89 9 30 05-350
Internet www.schaltbau.com
e-Mail contact@schaltbau.de

with compliments:



The production facilities of Schaltbau GmbH have been IRIS certified since 2008.



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Electrical Components and Systems for Railway Engineering and Industrial Applications

Connectors

- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

Snap-action switches

- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Snap-action switch made of robust polyetherimide (PEI)
- Snap-action switch with two galvanically isolated contact bridges
- Special switches to suit customer requirements

Contactors Emergency disconnect switches

- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency disconnect switches
- Special contactors to suit customer requirements

Electrics for rolling stock

- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements